Information Circular 88-1

NEW BRUNSWICK'S MINERAL INDUSTRY 1987

edited by
Barbara M. W. Carroll

Minerals and Energy Division
Department of Natural Resources and Energy
Province of New Brunswick

1988

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Department of Natural Resources
and Energy
Fredericton, New Brunswick

To all user groups:

It is my privilege to present this report on "New Brunswick's Mineral Industry, 1987", eleventh in a series of reports which the Minerals and Energy Division has prepared, for use by the mining industry.

Providing information to mining professionals on government programmes, mineral exploration, mine development and producing mines and quarries is a priority within the Department of Natural Resources and Energy. Cooperating in this way, government and the private sector have succeeded in building mining into the second largest industry in the Province and the fastest growing.

Youre sincerely,

MORRIS GREEN
Minister of Natural Resources
and Energy

Ministère des Ressources
naturelles et de l'Énergie
Fredericton (Nouveau-Brunswick)

À l'attention de tous les utilisateurs

Madame, Monsieur,

Je suis heureux de vous présenter le rapport intitulé "L'industrie minière du Nouveau-Brunswick 1987". Il s'agit du onzième rapport d'une série rédigée par le personnel de la Direction des minérais et de l'énergie à l'intention du personnel de l'industrie minière.

Une des priorités du ministère des Ressources naturelles et de l'Énergie est de fournir des renseignements aux professionnels sur les programmes du gouvernement dans le secteur minier, sur l'exploration minière, sur l'exploitation des mines et sur la création de mines et de carrières. En collaborant ensemble, le gouvernement et le secteur privé ont réussi à faire de l'industrie minière la deuxième industrie en importance dans la province et celle qui prend le plus rapidement de l'expansion.

Veuillez agréer, Madame, Monsieur, l'expression de mes sentiments les meilleurs.

MORRIS GREEN
Le ministre des Ressources
naturelles et de l'Énergie

Department of Natural Resources
and Energy
Fredericton, New Brunswick

The Honourable Morris Green
Minister of Natural Resources
and Energy
Fredericton, New Brunswick

Sir:

It is my privilege to submit to you for publication "New Brunswick's Mineral Industry 1987" and to thank the staff of the Minerals and Energy Division who have contributed to this report.

Information reported here serves as a historical record of annual mining activities within the Province which have not been described in other reports.

Yours sincerely,

BRYAN J. WALKER
Deputy Minister

Ministère des Ressources
naturelles et de l'Énergie
Fredericton (Nouveau-Brunswick)

L'honorable Morris Green,
ministre des Ressources naturelles,
et de l'Énergie
Fredericton (Nouveau-Brunswick)

Monsieur,

J'ai l'honneur de vous soumettre, aux fins de publication, le rapport intitulé "L'industrie minière du Nouveau-Brunswick 1987". De plus, je désire remercier les membres du personnel de la Direction des minerais et de l'énergie qui ont participé à la rédaction de ce rapport.

Les renseignements qui y figurent constituent un registre permanent des activités minières annuelles qui ont eu lieu dans la province et qui n'ont pas été décrites dans d'autres rapports.

Veuillez agréer, Monsieur, l'expression de mes sentiments les meilleurs.

BRYAN J. WALKER
Le sous-ministre

ACKNOWLEDGEMENTS

The staff members of the Minerals and Energy Division who have contributed sections to this report are:

1	W.F. Denny	12	T.C. Webb
2	S.L. DeVenney	13	Jacques J. Thibault
3	Dr. J.L. Davies	14	P.C. O'Leary
4	S.R. McCutcheon	15	J. Dean Thibault
5	Dr. A.A. Ruitenberg	16	S.K. McEwan
6	L.R. Fyffe	17	R. Butler
7	Greg Crouse	18	E.V. Jackson
8	R.R. Irrinki	19	W.R. Carr
9	D.J.J. Carroll	20	B.M.W. Carroll
10	G.J. Greer	21	C. St. Peter
11	A.A. Seaman	22	R. Phillips

Karen Gallagher, Diane Blair, and Freda Kelly contributed to the typing of this report and Gerry Johnson drafted maps and graphs. The photographs were obtained from the Division's collection, except Figures 2 and 8, which were obtained from E. Bagnell, and Figure 21, which was obtained from D. Keys.

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CHAPTER 1. GOVERNMENT ORGANIZATION AND PROGRAMMES

MINERALS AND ENERGY DIVISION[1]

Assistant Deputy Minister: William F. Denny
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-3862

New Brunswick, like other provinces in Canada, has traditional responsibilities with respect to the mineral resources it owns and controls. It administers, through a number of Acts, all matters related to the exploration, development, production, smelting, refining, transportation and taxation of its basic metallic, nonmetallic and structural material resources. The Minister of Natural Resources and Energy has sole responsibility for these Acts, which are administered by the Minerals and Energy Division.

Figure 1a indicates the position of the Minerals and Energy Division within the department; Figures 1b, 1c and 1d show the detailed organization of the three branches.

In late June, 1987, the Division and other branches of the Department moved into the Hugh John Flemming Forestry Centre (Figure 2) from a number of offices in the Fredericton area. This move will benefit staff member and the general public by bringing together in one area many of the services offered by the Department.

Staff Support (Administration and Word Processing)[2]

Administrative Services Officer: Sandra L. DeVenney
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-2206

Support staff of the Minerals and Energy Division report to the Assistant Deputy Minister. Staff support in 1987 was provided by Sandra DeVenney (Administrative Services Officer), Linda Ward (Secretary III), Diane Blair (Secretary II), Shelley Stephens (Secretary II), Carol Grant (Secretary II), Scotty Munn (Administrative Services Officer II, MDA), Caroll Barker (Secretary I), Peggy Jones (Secretary III), Sherry Munn (Secretary I, MDA), and Laura-Lee Williams (Secretary I, Energy Agreement).

Provincial budget of the Minerals and Energy Divison for the fiscal year 1987-88 was allocated as follows (Figure 3):

Mineral Development Branch	$ 524 298
Geological Surveys Branch	1 024 188
Energy Branch	846 085
Administration	329 956
	$ 2 724 527

Federal/provincial agreement budgets for 1987-88:

AGREEMENT	BUDGET	EXPENDITURES
Mineral Development	$ 3 148 432	$ 2 511 837
Energy	1 011 391	495 116
	$ 3 159 823	$ 3 006 943

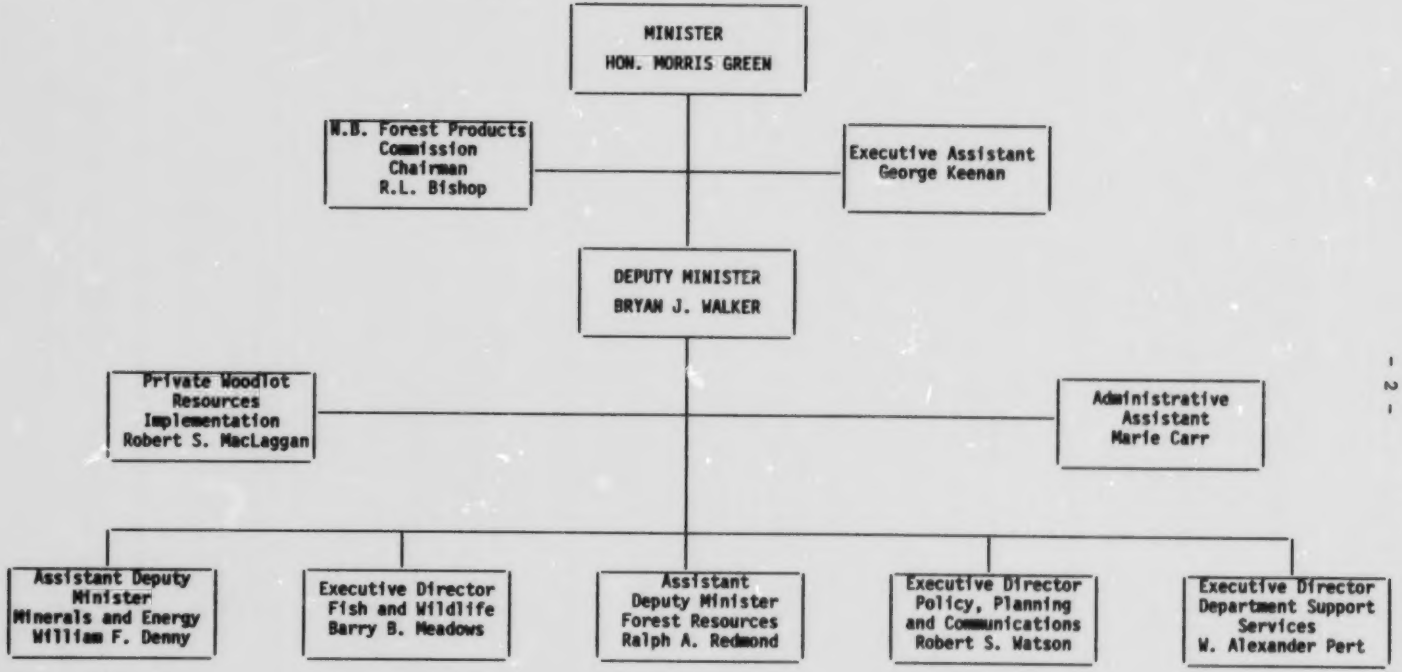
MINISTER
HON. MORRIS GREEN
N.B. Forest Products Commission Chairman R.L. Bishop
Executive Assistant George Keenan
DEPUTY MINISTER
BRYAN J. WALKER
Private Woodlot Resources Implementation Robert S. MacLaggan
Administrative Assistant Marie Carr
Assistant Deputy Minister Minerals and Energy William F. Denny
Executive Director Fish and Wildlife Barry B. Meadows
Assistant Deputy Minister Forest Resources Ralph A. Redmond
Executive Director Policy, Planning and Communications Robert S. Watson
Executive Director Department Support Services W. Alexander Pert

Figure 1a. Plan of Organization, New Brunswick Department of Natural Resources and Energy.

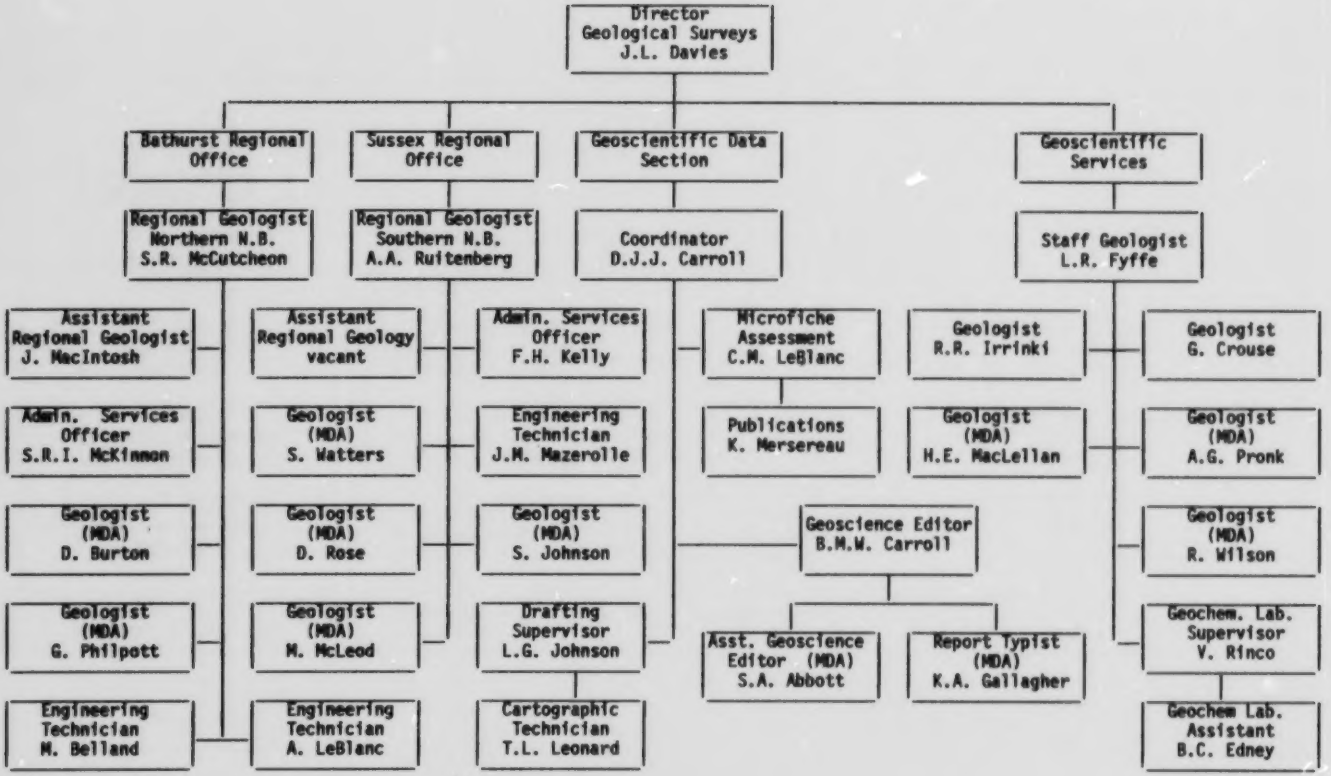

Figure 1b. Plan of Organization, Geological Surveys Branch.

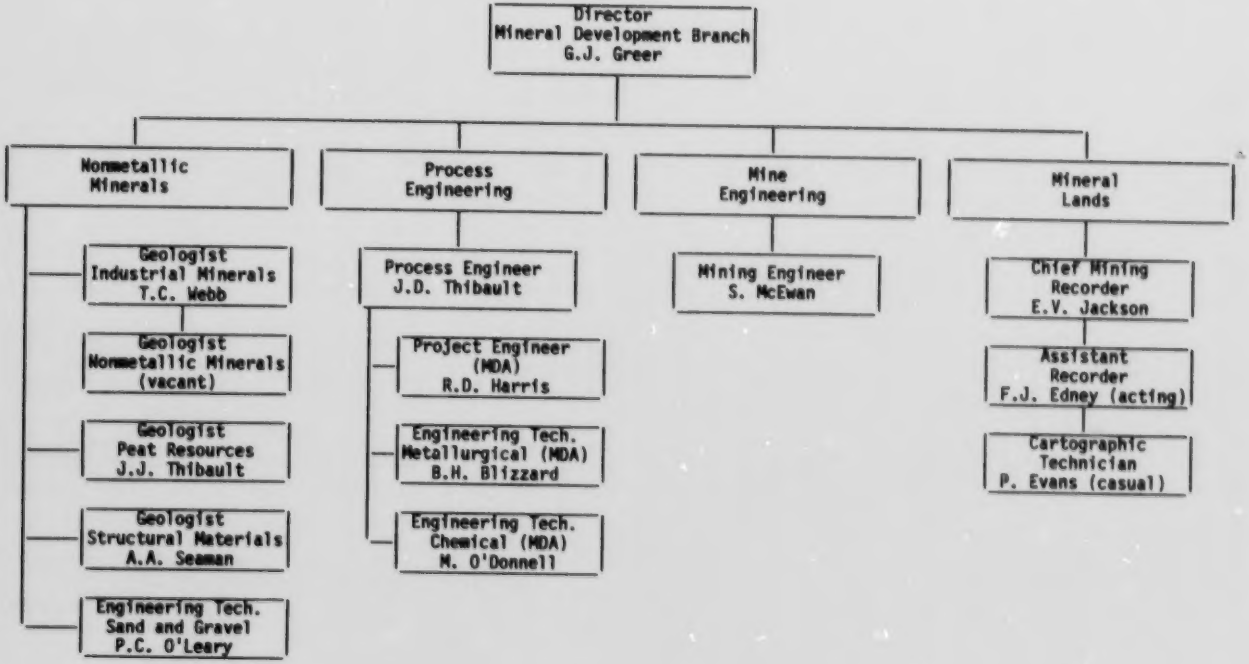

Figure 1c. Plan of Organization, Mineral Development Branch.

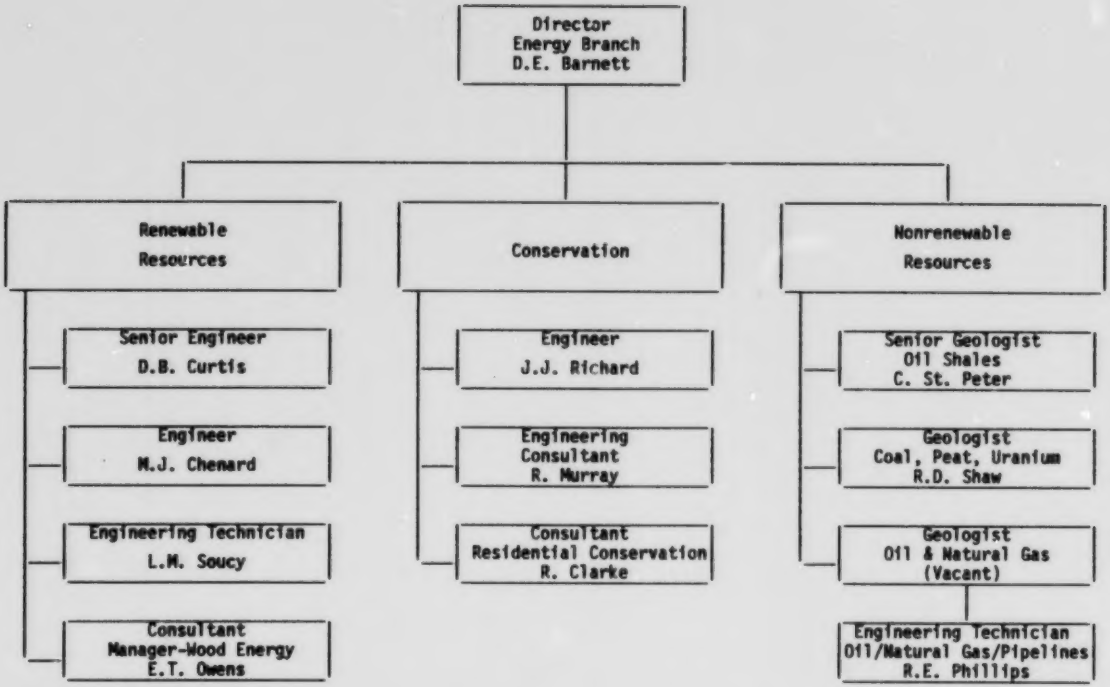

Figure 1d. Plan of Organization, Energy Branch.

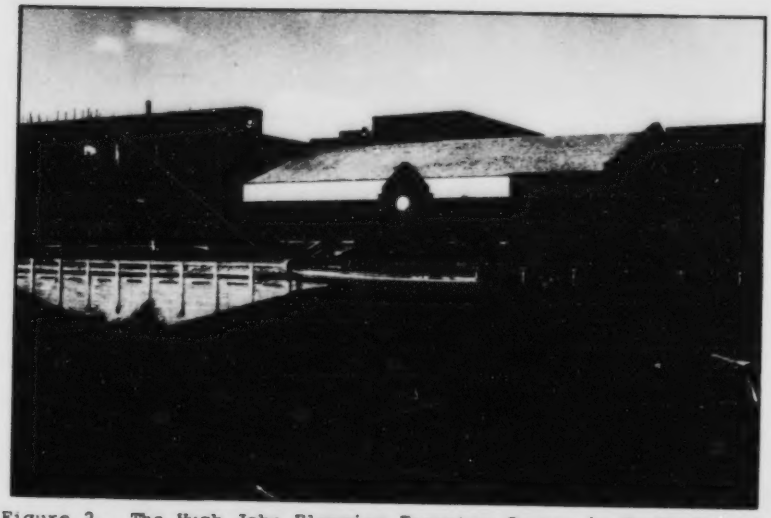

Figure 2. The Hugh John Flemming Forestry Centre in Fredericton houses the New Brunswick Department of Natural Resources and Energy, Canadian Forestry Service, and the Maritime Forest Ranger School.

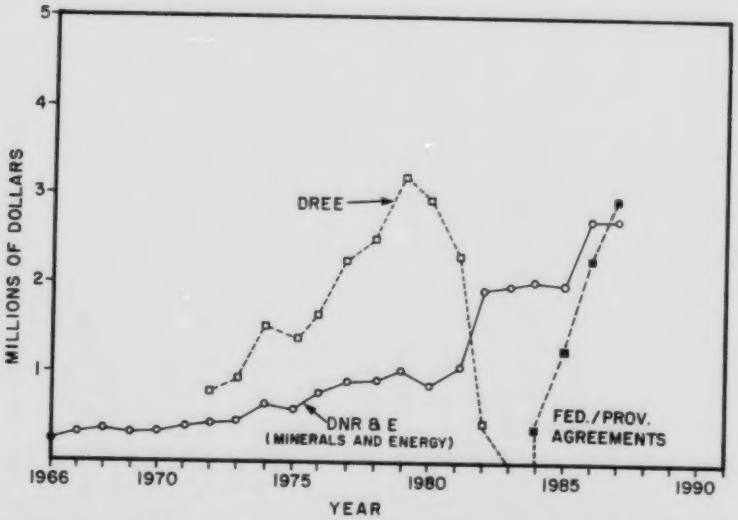

Figure 3. Budget of Minerals and Energy Division, 1966-1987. Federal/provincial agreements include Mineral Development and Energy agreements in 1987.

GEOLOGICAL SURVEYS BRANCH[3]

Director: Dr. J. Leslie Davies
Address: P.O. Box 6000, Fredericton, N.B. E3B 5H1
Telephone: 453-2206

The Geological Surveys Branch is responsible for the collection and dissemination of information pertaining to the geology and mineral deposits of New Brunswick. Closely associated activities include the encouragement of mineral exploration, the promotion of the mining industry, and assistance to those who formulate resource and land use policies. Although the activities of the Branch since its formation have been aimed at helping the mineral industry, there is an increasing awareness and use of geological knowledge in land use planning, environmental evaluations, engineering projects, and groundwater studies. The principal objective of the Branch is to provide a complete and up-to-date inventory of geological data to stimulate and guide mineral exploration, and to encourage sound resource planning.

Numerous field projects were carried out in 1987, mainly in the areas of higher mineral potential in northern and southern New Brunswick. Projects that were continued from the previous year included mineral deposit studies, regolith mapping, drill core collection and storage, geoscience data management, preparation of public displays, and continuation of stream silt geochemical surveys (Figure 4).

Many of the Branch's activities in 1987 were carried out under the Canada-New Brunswick Mineral Development Agreement (MDA). This accord entails an expenditure of $22 300 000 over a five-year period (1984-1989) on geoscience, mineral technology, and public awareness programmes.

Bathurst Regional Office[4]

Regional Geologist: Steven R. McCutcheon
Address: P.O. Box 50, Bathurst, N.B. E2A 3Z1
Telephone: 547-2070

The staff of the Bathurst Regional Office in 1987 consisted of Steven R. McCutcheon (Regional Geologist), Jim A. MacIntosh (Assistant Regional Geologist), Sharon McKinnon (Administrative Services Officer), and André LeBlanc and Maurice Belland (Engineering Technicians). Steven R. McCutcheon became the Regional Geologist for northern New Brunswick on September 1st, 1987, replacing Dr. Davies. Donald M. Burton, Gregory R. Philpott, John Creamer, and Michael Parkhill are contract geologists responsible for projects funded through the Canada-New Brunswick Mineral Development Agreement (MDA). Terry G. Mersereau assisted in the MDA-funded geoscience compilation project. Most of the field work and data collection activities conducted from the Bathurst Regional Office utilized MDA funds (Figure 4, No. 1-4, 11, 12) because provincial budgets alone are not sufficient to sustain large projects.

CANADA-NEW BRUNSWICK MDA PROJECTS Don Burton supervised a lithogeochemical sampling program in the southern and eastern parts of map area 21 O/10 to look for alteration

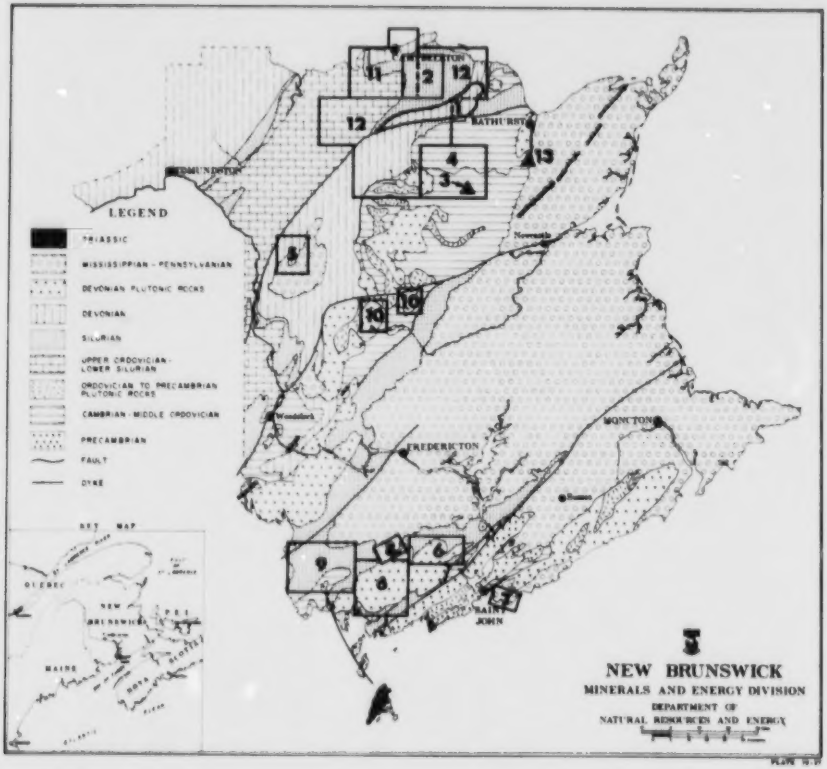

Figure 4. Areas in which Geological Surveys Branch projects were conducted in 1987: (1) gold potential along Jacquet River Fault (MDA); (2) gold potential of Charlo River area (MDA); (3) Heath Steele structural study (MDA); (4) geoscience compilation, 21 O/8 (MDA); (5) mapping, New Denmark area (MDA); (6) mapping, eastern and western Saint George Batholith (MDA); (7) mapping, gold-bearing rocks, Cape Spencer area (MDA); (8) Mount Pleasant Caldera project; (9) till mapping, Rollingdam (21 G/6); (10) mapping, Burnthill area (MDA); (11) surficial geology, Atholville (21 O/15) and part of Oak Bay (22 B/1) and Escuminac (22 B/2) (MDA); (12) geochemical studies; (13) Key Anacon study.

zones, and test them for their precious metal potential. Greg Philpott conducted a similar program in the Charlo River area, in the eastern and western parts of map areas 21 O/15 and 21 O/16, respectively (Figure 4). The area was chosen because of its potential for Carlin-type gold deposits.

T.G. Mersereau supervised the production of twenty-five 1:10 000 geoscience compilation maps for NTS map area 21 O/8 (Figure 4). The maps were produced by K.D.A. Whaley and Three-D GeoConsultants Limited. Base maps (1:10 000 scale) were prepared by Maritime Resource Management Service Inc. for 21 P/5, 21 O/8 and 21 O/10.

The Geology Department of the University of New Brunswick completed the first year (Phase I) of the Heath Steele mine study (Figure 4) and work has commenced on Phase II under the guidance of P.F. Williams, A.L. McAllister, and J.G. Torrance.

Approximately 1500 stream silt samples, collected between 1973 and 1980 from the Charlo (21 O/16), Kedgwick (21 O/11E), Upsalquitch Forks (21 O/10), Tetagouche Lakes (21 O/9W), and Nepisiguit Lakes (21 O/7) areas, were analysed for gold, barium, arsenic, and antimony (Figure 4). Results were released in 1987. (See Geoscientific Services Section, p. 14 and Geoscientific Data Section, p. 16)

PROVINCIAL PROJECTS J.A. MacIntosh completed his provincially funded mapping project in the Heath Steele mine area. The map and report covering this work are in preparation. In 1987, Mr. MacIntosh carried out geological mapping in the Tetagouche Lakes (21 O/9) area to resolve correlation problems arising from previous mapping at 1 inch equals 1/4 mile scale.

R.R. Irrinki of the Fredericton office completed his study of the Key Anacon sulphide deposit, in which computer-derived plans and sections were used for the first time. The Halfmile Lake sulphide deposit is the next deposit to be examined. (See Geoscientific Services Section, p. 14)

DIAMOND-DRILL CORE In 1987, several thousand metres of diamond-drill core was collected from the Key Anacon and Mount Costigan sulphide deposits. Core-storage racks are being built at the Madran facility to accommodate the thousands of metres of core now piled at the site. (See Geoscientific Services Section, p. 13)

OTHER ACTIVITIES André LeBlanc and Sharon McKinnon continued their work related to claim staking and recording. Claims data are now made available to the Regional Offices on computer disk, thus eliminating the Kardex system used for many years.

Mr. LeBlanc continued his duties related to updating claim maps and resolving plotting difficulties. He also drafted most maps generated by the geological staff and continued his work of transferring claims data to new 1:50 000 base maps and keeping mineral exploration assessment index maps up to date. Mr. LeBlanc also carried out claim inspections in the field.

M. Belland continued to compile exploration assessment data, and assisted the Regional Geologist in coordinating mineral exploration activities with forestry operations.

Sussex Regional Office[5]

Regional Geologist: Dr. Arie A. Ruitenberg
Address: P.O. Box 1519, Sussex, N.B. E0E 1P0
Telephone: 433-4317

The staff of the Sussex Regional Office in 1987 consisted of Arie A. Ruitenberg, Regional Geologist; Stephen R. McCutcheon, Assistant Regional Geologist; Maurice R. Mazerolle, Engineering Technician and Freda H. Kelly, Administrative Services Officer. Malcolm J. McLeod, Sheila E. Watters, David G. Rose and Susan C. Johnson were employed on long-term contracts associated with the Mineral Development Agreement between the Government of Canada and the Province of New Brunswick. On September 1, 1987, Stephen McCutcheon became Regional Geologist for northern New Brunswick. The position of Assistant Regional Geologist at the Sussex office was vacant the remainder of the year.

PROGRAMMES AND PROJECTS M.J. McLeod completed detailed (1:20 000) mapping of the Late Devonian eastern Saint George Batholith (Figure 4). Suites from various granitic phases and mineralized zones were collected for major- and trace-element analysis and petrographic studies. In addition an $Ar^{40/39}$ age dating program was carried out. A distinct relationship was established between endocontact tin- and tungsten-bearing greisens and the youngest phases of the intrusive complex. Exocontact occurrences (mainly gold) and their relationship to shear zones and mafic-intermediate stocks were also investigated.

W.W. Gardiner commenced detailed (1:20 000) geologic mapping of the Middle Devonian western Saint George Batholith (Figure 4). Representative samples from various mafic-intermediate phases of this complex intrusion were collected for major- and trace-element analysis and petrographic studies. A limited $Ar^{40/39}$ age dating program was also carried out. Auriferous quartz-carbonate veins are locally associated with the western Saint George Batholith.

S.E. Watters continued field work and laboratory investigations on gold deposits and occurrences in the Bay of Fundy coastal zone (Figure 4). The focus of work during 1987 has been on detailed study of the large amount of recently drilled cores from the Cape Spencer deposits of Gordex Minerals Limited and Mispec Resources Inc. The auriferous tectonites in this area are mainly related to Hercynian thrusting (D_2) that postdated penetrative deformation (D_1). The thrusting juxtaposed Precambrian granitoids over Carboniferous or older arkosic sedimentary rocks. The auriferous and altered tectonites in the thrust zone are derived from both the granodiorite and arkosic sedimentary rocks.

Re-examination by the regional geologist of gold-bearing structures in the Dipper Harbour-Little Dipper Harbour

and Musquash Harbour areas southwest of Saint John demonstrated that these gold occurrences are also related to thrust zones. In the Dipper Harbour-Little Dipper Harbour area, auriferous quartz-carbonate veins are associated with a northerly directed thrust zone that juxtaposed Precambrian rhyolite over Carboniferous clastic sedimentary rocks.

S.R. McCutcheon completed his investigation of the Mount Pleasant Caldera complex (Figure 4). Rocks in this area were separated into five sequences: (1) precaldera, (2) exocaldera, (3) intracaldera, (4) late caldera-fill, and (5) postcaldera. The exocaldera, intracaldera and late caldera-fill sequences constitute the Late Devonian to Early Carboniferous Piskahegan Group. The results of the caldera study have been incorporated into a Ph.D. thesis at Dalhousie University, Halifax, N.S.

D.G. Rose and S.C. Johnson with assistance from D.L. Drury and W.W. Gardiner continued to compile and code mineral occurrence data, which were entered in a d-Base computer file. The original file structure has been modified. A limited amount of field checking of occurrences has been done where insufficient information was available or new discoveries were made.

A surficial geologic mapping and geochemical sampling program was conducted by P. Chiswell in the eastern half of the Rollingdam map sheet (21 G/6) (Figure 4). This area covers the Honeydale Thrust along which Ordovician graphitic slates, siltstones, and sandstones are superimposed on Silurian turbidites. Several gold occurrences of economic interest are known in this area. The sampling program resulted in the detection of several prominent gold anomalies.

The discovery of platinum-group elements in the Precambrian ultramafic-mafic intrusive complex near Mechanic Settlement in the Caledonia Highlands generated much interest. Reconnaissance mapping of the complex by A.D. Paktunc of the Geological Survey of Canada revealed that the intrusion is layered and consists of troctolite, picritic troctolite, olivine gabbro, peridotite and pyroxenite units. Sulphide concentrations (up to 4-5%) occur in troctolitic and peridotitic rocks. Platinum-palladium concentrations are in the peridotite phase.

Consultations were provided for many geologists, prospectors and engineers during the year. The main interest continued to be gold deposits and, more recently, platinum-group elements.

Geological advice related to forest site classification was provided to foresters employed by government and the forest industry. Regolith maps for northern and southern New Brunswick, prepared by A.G. Pronk and P.G. Chiswell respectively, provide essential information on nutrient potential, internal drainage, and general ground conditions.

Geoscientific Services Section[6]

Staff Geologist: Leslie R. Fyffe
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Telephone: 453-2206

The Geoscientific Services staff at Hugh John Flemming Forestry Centre in Fredericton consists of L.R. Fyffe (Staff Geologist), and R.R. Irrinki (Metallic Minerals Geologist). Staff at the Soils and Minerals Building include G.W. Crouse (Core Librarian), V. Rinco (Geochemical Analyst), and B. Edney (Laboratory Assistant). They are scheduled to move to the Hugh John Flemming Forestry Centre when the Ancillary Building is completed in the latter part of 1988.

In addition to the regular staff activities, several projects were carried out by contract and summer personnel under the MDA. In central New Brunswick, H. Elizabeth MacLellan continued work on the Burnthill project; A.G. (Toon) Pronk mapped the surficial geology of the Atholville (21 O/15) and parts of Oak Bay (22 B/1) and Escuminac (22 B/2) map areas; and Reginald A. Wilson continued his geological mapping in the New Denmark area. (Figure 4)

GEOLOGY Field mapping has been completed in the Burnthill area (21 J/10) and a complete set of maps has been published.

A paper entitled "Age and genesis of granite-related W-Sn-Mo mineral deposits, Burnthill, New Brunswick, Canada" by R.P. Taylor, D.R. Lux, H.E. MacLellan, and F. Hubacher has been published in the December, 1987 issue of Economic Geology. A paper on the lithogeochemistry of the Burnthill Granite has been accepted for publication in the Canadian Journal of Earth Sciences. A suite of rock samples from the Burnthill pluton has been analysed for various metals and the results will be released by the Minerals and Energy Division in a Geoscience Report by L.R. Fyffe and H.E. MacLellan.

A paper on the surficial geology and till geochemistry project was presented at the Atlantic Geoscience Society Symposium in Fredericton and at the 12th International Congress for Quaternary Research in Ottawa. The results of the study will be released by the Minerals and Energy Division in a Geological Notes Series report.

Bedrock geological mapping in the New Denmark area, Victoria County, N.B., was continued during 1987 with the completion of the western portion of the Riley Brook (21 O/3W) and the eastern portion of the Grand Falls (21 O/4E) map area. The area is underlain by lower Paleozoic sedimentary and volcanic rocks comprising portions of two tectonostratigraphic zones juxtaposed along the Rocky Brook-Millstream Fault: the Aroostook-Matapedia Zone to the west, and the Tobique Zone to the east. Analysis of various trace-element abundances in Silurian basalts of the Tobique Zone indicates that volcanism took place in an extensional within-plate environment.

No pervasive alteration or mineralization, except for minor pyrite in volcanic rocks, was observed in the survey area. The highest base-metal values (458 ppm Zn and 206 ppm Pb) are located at the head of Four Mile Brook, southeast of Lower Blue Mountain (21 O/3). Mineral exploration has been limited within the survey area, and almost all activity has focused on Lower Blue Mountain. Canadian Occidental Petroleum Limited has had the most success in terms of anomalous metal values, with up to 184 ppm U, 1020 ppm Zn, and 325 ppm Pb in

stream sediments from Four Mile and Blue Mountain brooks, and 245 ppb Au in heavy mineral samples. Geochemical analyses for arsenic, antimony, barium, and gold in stream sediments of the Riley Brook area (21 O/3) were released in October, 1987.

L.R. Fyffe visited the field camps of the Geological Survey of Canada (GSC) in both northern and southern New Brunswick and assisted in the collection of samples for zircon age determinations. He also attended the G.S.C. Open House in Ottawa where the results from G.S.C. projects in New Brunswick and the rest of Canada were on display. Papers on these projects were presented at the Geological Association of Canada/ Mineralogical Association of Canada annual meeting, also held in Ottawa, and Atlantic Geological Society annual meeting held in Antigonish, N.S. Exchange field visits were made with American geologists to confirm correlations between rock formations in New Brunswick and adjacent Maine (Figure 5).

DRILL CORE MANAGEMENT[7] Approximately 20 000 m of core has been donated to the Province by mining companies this year. This includes core salvaged from the Key Anacon property where the core building was destroyed by vandals. Unfortunately, approximately 80% of the core at Key Anacon was unsalvageable. An area is being cleared at the Madran core repository to accommodate the construction of buildings to house approximately 60 000 m of core. The Department's computerized data base for storing drill core information is being updated.

Figure 5. During an exchange of field trips in Maine and New Brunswick, David Stewart (right) of the U.S. Geological Survey and Olcott Gates (left) examine the famous unconformity between Ordovician black slate of the Cookson Formation (to the left) and massive Silurian conglomerate of the Oak Bay Formation (to the right) on Cookson Island.

GEOCHEMISTRY[6] Analyses were performed on 531 till samples collected by Toon Pronk in 1986 (NTS 21 O/10). Eight elements (copper, lead, zinc, manganese, iron, cobalt, nickel, silver) were analysed by atomic absorption and two (antimony, molybdenum) by colorimetry. A further 257 samples that were returned to us after analyses by Chemex Labs Ltd. of Vancouver for gold, antimony, barium, and arsenic were later analysed for the above-mentioned eight elements.

One hundred and seventy-five samples collected by Paul Chiswell in the St. George area (NTS 21 G/2) were analysed for five elements (copper, lead, zinc, cobalt, and silver) by atomic absorption, and two elements (antimony and tungsten) by colorimetry.

A total of 1569 samples were analysed by Chemex Labs Ltd. for gold, arsenic, antimony, and barium. These samples were taken from (Figure 4):

Charlo area (21 O/16) in 1973
Kedgwick area (21 O/11E) in 1980
Upsalquitch Forks area (21 O/10) in 1980
Tetagouche Lakes area (21 O/9W) in 1980
Nepisiguit Lakes area (21 O/7) in 1976 and 1979

Results were released in the spring of 1987. Another 570 samples from the Riley Brook area (21 O/3) were analysed for gold, arsenic, antimony, and barium in 1982. Results were released in October, 1987.

SULPHIDE DEPOSITS STUDY[8] The Key Anacon and Halfmile Lake sulphide deposits (Figure 4) are the second and third deposits, respectively, to be evaluated as part of a provincially funded study being carried out on important base metal deposits in northern New Brunswick.

A comprehensive, confidential report has been finalized on the Key Anacon sulphide deposit. This report consists of the following: abstract, history and previous work, regional geology, mineralization, tonnage calculations, computerization of drill-hole data, Key Anacon No. 1 Zone (introduction, geology, mineralization, tonnage calculations), Key Anacon No. 2 Zone (introduction, geology, mineralization, tonnage calculations, mining, metallurgy, feasibility studies, possible extension of the mineralized zone), Key Anacon No. 3 Zone (introduction, geology, mineralization, tonnage calculations), and the copper zones (Road Side Copper Zone, Discovery Copper Zone).

The Halfmile Lake sulphide deposit, 18 km west of the Heath Steele mine, contains three northeast-trending en echelon lenses. The three zones, from west to east, are known as Halfmile Lake (Texasgulf), Halfmile Lake (Conwest) and Halfmile Lake (North). Drill-hole data on these three zones have been entered into the computer. Relogging of all available drill core, geological and mineralogical studies, and estimation of the reserves will be carried out in 1988.

Besides the work done on the sulphide deposits, the drill-hole data on the Lake George antimony mine and the Burnthill tungsten deposit have been entered into the computer.

Geoscientific Data Section[9]

Coordinator: Donald J.J. Carroll
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Telephone: 453-2206

The Geoscientific Data Section consists of the following staff members: Donald J.J. Carroll (Coordinator), L. Gerard Johnson (Cartographic Technician), Terry Leonard (Cartographic Technician), Ken Mersereau (Publications Officer), Carol M. LeBlanc (Microfiche/Assessment Files Officer), Barbara M.W. Carroll (Geoscience Editor), Shasta A. Abbott (Assistant Geoscience Editor - MDA), Karen A. Gallagher (Report Typist - MDA).

The Geoscientific Data Section of the Geological Surveys Branch is responsible for providing a variety of geoscientific, technical, and support services to the staff of the Minerals and Energy Division of the New Brunswick Department of Natural Resources and Energy. In addition, the staff of the Section provide assistance to the public, in particular the mineral industry, by supplying publications on the geology and mineral resources of the Province.

The Geoscientific Data Section is made up of Geoscientific Editorial Services, Geoscientific Cartographic Services, and Geoscientific Information Services (Figure 1b).

The year 1987 represented one of increased activity for the staff of the Geoscientific Data Section. This is due to an increase in project activity at the midterm of the Canada-New Brunswick Mineral Development Agreement (1984-89) and an increase in mineral exploration activity in New Brunswick. As a result, staff have received more scientific reports and maps to be edited and prepared for distribution.

Some of the activities carried out during the calendar year 1987 are summarized below.

GEOSCIENCE EDITORIAL SERVICES The responsibility of this unit is to edit all geoscientific reports and maps that are produced by or for the Minerals and Energy Resources Division.

In 1987, the staff of this section edited and/or prepared for publication 34 reports and approximately 175 maps.

GEOSCIENTIFIC PUBLICATIONS The Geoscientific Information Services unit of the Geoscientific Data Section plays an important role in the dissemination of geoscientific data to the mineral exploration industry as well as to engineers, consultants, and the general public. This section also distributes data on New Brunswick that has been prepared by or for the Geological Survey of Canada. Some of these were funded under the Canada-New Brunswick Mineral Development Agreement (1984-89).

In 1987, the Geoscientific Data Section released more than 170 publications consisting of plates (mainly maps) and reports and involving four public releases of Geological Survey of Canada geochemical and airborne geophysical survey results

and five releases of Minerals and Energy Division geological and geochemical survey results. These surveys were funded under the Canada-New Brunswick Mineral Development Agreement (1984-89). The releases are listed below.

Geological Survey of Canada maps and reports released on the following dates:

May 26, 1987	Maps - High resolution aeromagnetic total field and vertical gradiometer surveys, Bathurst area (NTS 21 J/13g,h; 21 J/14a,b,c,d,e,f,g,h; 21 J/15c,d,e,f; 21 O/2c,d,e,f; 21 O/3a,b,c,d,e,f,g,h).
June 24, 1987	Maps - Regional stream sediment and water geochemical reconnaissance data, southern New Brunswick (parts of NTS 21 G/1,8; 21 H/4,5,6,10,11,12,14,15). Plates 87-22A and B to 87-46A and B. Report - GSC Open File 1355 to accompany these plates.
September 24, 1987	Maps - Open File 1548. Airborne gamma ray spectrometric colour maps and VLF profile maps, Holmes Lake area (NTS 21 J/15, 21 O/2).
October 27, 1987	Maps - Geophysical Series. Airborne gamma ray spectrometric VLF and magnetic survey, Campbellton-Bathurst area (NTS 21 O/9,10,15,16; 21 P/5, 12,13; 22 B/1,2). Plates 87-63A to 87-69G, 87-70A, 87-70B.

Minerals and Energy Division maps and reports released on the following dates:

April 14, 1987	Map - Geochemical Data. Gold in tills, Tetagouche Lakes map area (NTS 21 O/9). Plate 86-216B.
August 4, 1987	Maps - Surficial geology and till geochemistry of the Upsalquitch Forks map area (NTS 21 O/10). Plates 87-47A to D. Report - Geological Notes Series PM 87-47.
August 4, 1987	Maps - Geochemical Data. Analysis of previously collected samples for arsenic, antimony, barium and gold (NTS 21 O/7,9W,10,11E,16W). Plates 87-49, 81-46h, 81-48j, 81-49j, 81-50j, 81-47j, 87-48.
October 20, 1987	Maps - Geochemical Data. Till geochemistry and surficial geology of the Mascarene Peninsula and southern Deer Island. (NTS 21 G/2c,d; parts of 21 B/14h,15e). Plates 87-12A to D.

October 27, 1987	Map - Geochemical Data. Stream and spring sediments analysed for arsenic, antimony, barium and gold, Riley Brook map area (NTS 21 O/3E). Plate 79-50g.
October 27, 1987	Maps - Geochemical Data. Stream sediments analysed for arsenic, antimony, barium and gold, Riley Brook map area (NTS 21 O/3c,d,e,f). Plates 84-8g, 84-9g, 84-10g and 84-11g.
November 19, 1987	Report - Lithogeochemistry and metallic mineral potential of volcanic rocks along the Jacquet River Fault (NTS 21 O/9e,f,g; 21 O/10a,b,g,h; 21 O/16a,b). Open File Report 87-18. Maps - Plates 87-61A to E to accompany this report.

The distribution and sales of geoscience publications from the Fredericton office in the 1987 calendar year totalled more than 6600 maps and reports, representing revenue of $18 940. The majority of these sales were to individuals working for the mineral exploration industry.

GEOSCAN In 1987, the Geological Survey of Canada's computer-based bibliographic geoscience data file called GEOSCAN was again updated with the addition of more than 100 coded assessment reports.

As in previous years, custom GEOSCAN indexes were specially produced for the 56th Annual Meeting and Convention of the Prospectors and Developers Association in Toronto and the Minerals and Energy Division's twelfth annual Review of Activities, held in November. These indexes to assessment report data covered the years 1985-86 (updated version) and 1986-87 (preliminary).

MINERAL EXPLORATION ASSESSMENT FILES A total of 115 assessment reports were received by the Mining Recorder's office in the 1987 calendar year. Beginning in 1987, mineral right holders could request a period of confidentiality for submitted assessment reports. As a result, these confidential assessment reports will be microfilmed and made available to the public after their release date. All reports that are available to the public have been microfilmed and duplicate microfiche have been distributed to the six regional libraries in New Brunswick and the two regional Geological Surveys Branch offices (Bathurst and Sussex).

Anyone wishing to purchase either a complete set or selected files of the New Brunswick assessment data on microfiche may do so by contacting Precision Microfilming Services, 6100 Young Street, Halifax, N.S. B3K 2A4.

AUDIOVISUAL PRODUCTS The Geoscientific Information Services unit maintains a library of audiovisual products related to the geology and mineral resources of New Brunswick as well as related programs that we feel may be of interest to the general public. The following are available on a loan basis.

1. "The Awakening Giant" (video)
2. "Sensible Sequence" (video)
3. "Coastline Conservation" (video)
4. "The Beach - A River of Sand" (video)
5. "Mineral Industries of New Brunswick" (slide/tape)
6. "New Brunswick's Peat Resources" (slide/tape)
7. "Carboniferous Drilling Project" (slide/tape)
8. "Taming a Hazardous Waste with Lime" (video)
9. "Lime - The Versatile Chemical" (video)
10. "The Mineral Wealth of Atlantic Canada" (video)
11. Peat Research Centre - Shippagan (slide/tape)

Anyone wishing to borrow these video or slide/tape productions are requested to contact the Geoscientific Data Section in Fredericton. (The address and telephone number are given on p. 15.)

Audiovisual media (film, video, photographic images) are an important part of the Public Awareness Programme under the Canada-New Brunswick Mineral Development Agreement (1984-1989) and of the Division's information awareness activities.

One of the highlights of 1987 has been the completion of two video programmes that were commenced in 1986. The first production entitled 'The Mineral Wealth of Atlantic Canada' was sponsored by the Atlantic Geoscience Society and funded under the Canada-Nova Scotia and Canada-New Brunswick Mineral Development agreements (1984-89). It has been very well received by industry and educators. Energy, Mines and Resources Canada has made hundreds of copies available to schools across the Atlantic Provinces.

The completion of another video sponsored by AGS, 'The Appalachian Story,' is scheduled for early 1988.

The second completed video project was one produced by the Department of Natural Resources and Energy entitled 'Forging a Greater Future.' This video concentrates on New Brunswick's mineral wealth and emphasizes the potential for secondary manufacturing opportunities.

PUBLIC AWARENESS In 1987, the Geoscientific Data Section was extensively involved in activities aimed at increasing the general public's awareness of New Brunswick's rich and diversified mineral resources.

Under the Canada-New Brunswick MDA, both the province, through the Department of Natural Resources and Energy, and the federal government through the Department of Energy, Mines and Resources (EMR) can undertake projects separately or, in the case of Public Awareness Programmes, can jointly fund or participate in projects.

Cooperative projects were carried out with the New Brunswick Mining Association and with EMR's Canada-New Brunswick MDA (1984-89) public information coordinator (Grant Yoxon, Regional Manager - Public Affairs). A summary of some of these activities follows.

The Geoscientific Data Section had developed and exhibited three displays. The first, produced by the Geolgical Surveys Branch, consisted of a series of panels showing some of

the detailed field work being carried out by the geological staff of the Division. This exhibit was New Brunswick's contribution to the Provincial Geologists' displays at the 56th Annual Meeting and Convention of the Prospectors and Developers Association held in Toronto in March.

The second exhibit, aimed at the general public, focused on New Brunswick's potash resources and potash industry. It was produced by Butler Design and Graphics and Projects Unlimited. Full cooperation and assistance were given by the Potash Company of America and Denison-Potacan Potash Company. This exhibit has been shown in the Sussex area.

A third display unit was produced for the New Brunswick Mining and Mineral Interpretation Centre at Petit Rocher. It was funded under the Canada-New Brunswick MDA (1984-89) and produced by the graphic arts staff of the Communication Section, New Brunswick Department of Natural Resources and Energy. The display, intended for the tourists to our province, consists of an enlarged version of the New Brunswick Geological Highways Map and includes revolving units highlighting four geological features (Figure 6).

Additional public awareness activities in 1987 included projects aimed at increasing the awareness of school students and teachers with respect to geology and mineral resources. Late in 1986, Gwen Martin of Projects Unlimited was commissioned to survey schools in the Province to determine whether junior high school teachers would be interested in having a geologist talk to Grade 7 students about geology and mineral resources.

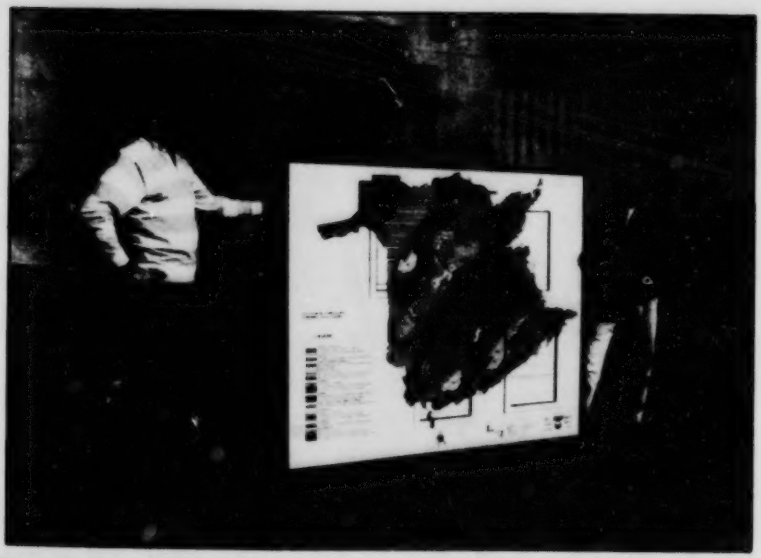

Figure 6. Gerry Johnson (left) delivers a display to the Mining and Mineral Interpretation Centre in Petit Rocher. Serge Paquin (right), Director of the Centre, assists.

The N.B. Department of Education, supportive of the concept, was immediately flooded with requests from school districts for this programme. As a result, Projects Unlimited was commissioned to produce a 50-minute programme called "On the Rocks." As a result of the tour, which began early in 1987 and concluded at the end of April, the "On The Rocks" programme was presented to more than 350 classes (11 000 students) in 71 schools (Figure 7). Follow-up evaluation confirmed that this type of project (funded under the Canada-New Brunswick Mineral Development Agreement, 1984-89) was very well received, and beneficial to students and teachers alike.

In 1987, the Natural Sciences Division of the New Brunswick Museum received funding from Energy, Mines and Resources Canada under the Canada-New Brunswick Mineral Development Agreement (1984-89) to support the purchase of special museum-quality storage cabinets. These units were obtained for the purpose of housing their invaluable collection of New Brunswick fossils, mineral and rock specimens.

REVIEW OF ACTIVITIES The 1987 annual Review of Activities of the Minerals and Energy Division was held on November 23-24 at the Fredericton Inn.

More than 250 individuals representing the mineral industry, university, general public, research institutions, engineering consulting firms and various federal-provincial government departments were in attendance (Figure 8).

In addition to the technical session, there was a poster session consisting of 39 exhibits of on-going projects, including those projects funded under the Canada-New Brunswick Mineral Development Agreement.

MINERAL DEVELOPMENT BRANCH[10]

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The Mineral Development Branch is composed of the Director's office and four sectors: Nonmetallic Minerals, Process Engineering, Mine Engineering, and Mineral Lands. The nonmetallic minerals sector is responsible for industrial minerals, nonmetallic minerals, peat resources and sand and gravel (Figure 1c). On January 1, 1987, the energy-related activities (shale, coal, oil and natural gas, and pipeline inspections) of the Mineral Development Branch were moved to the newly formed Energy Branch (Figure 1d). Effective April 1, 1987, Mine Taxation was moved to the Financial Services section of Departmental Support Services.

The Mineral Development Branch's overall goals are to ensure that mineral deposits are developed at the optimum rate consistent with long-term income and employment objectives, to enhance the viability of marginally economic mineral deposits, to ensure that inactive mining operations are rehabilitated to a state that would avoid on-going costs to the public and, where possible can be economically productive in other uses, to ensure the highest degree of in-province processing and to maximize recovery, both in the mining and primary processing stages.

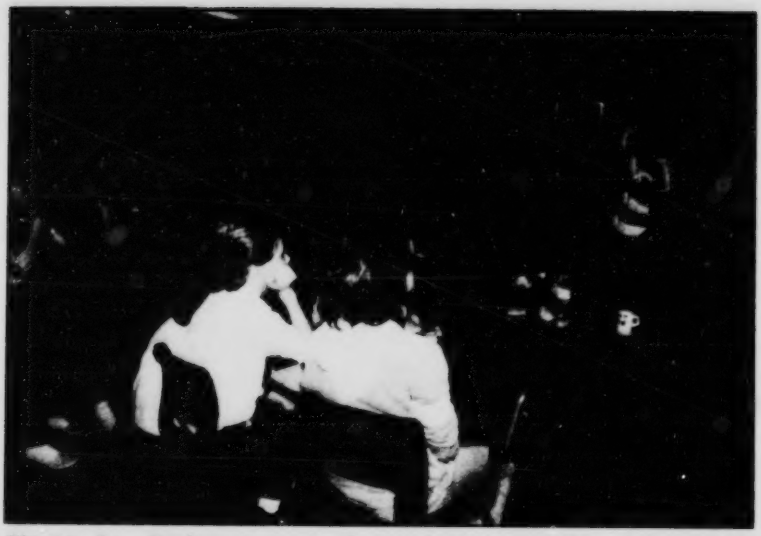

Figure 7. During a tour of provincial schools, Gwen Martin talks to Saint John area students about the mineral industry in New Brunswick.

Figure 8. (left to right) J.L. Davies, Director of Geological Surveys Branch, Hon. Morris Green, Minister of Natural Resources and Energy, and Bryan Walker, Deputy Minister, receive their registration information from Carol LeBlanc at the 1987 Review of Activities.

At year's end, the Mineral Development Branch administered the Mining Act, the Quarriable Substances Act, and the Ownership of Minerals Act. Copies of these Acts and Regulations thereunder are available from the Queen's Printer.

Nonmetallic Minerals Sector

Industrial Minerals Geologist: Timothy C. Webb
Peat and Coastal Zone Geologist: Jacques J. Thibault
Quaternary Geologist: Allan A. Seaman
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AGGREGATE RESOURCE INVENTORY[11] The New Brunswick aggregate resource inventory programme, begun in 1974, was completed in 1987 with the writing of the last four aggregate reports. These reports were for the following areas: Waterford (21 H/11) and Salmon River (21 H/6); Grand Manan Island (21 B/10) and Campobello Island (21 B/14,15); Hampstead (21 G/9); and St. George (21 G/2). (Figure 9) These reports will be released in the above order.

LIMESTONE[12] It is becoming increasingly important to sufficiently identify Provincial limestone deposits with respect to quality, apparent reserves, and factors affecting potential development in order to confront the anticipated rigid market requirements of the future. As a move in this direction, the New Brunswick Department of Natural Resources and Energy is currently re-examining and reassessing the Province's limestone resources, found principally in rocks of Precambrian, Silurian and Mississippian age (Figure 9). The project consists of five main phases that address such topics as historical development and current status of the limestone industry, and practical geologic aspects of known deposits and occurrences. A number of important deposit characteristics (grade ranges, reserves, development potential, etc.) will be combined into a computerized information retrieval system for quick reference.

The present status and related output of this project are summarized below and in Figure 10. The expected completion date of this limestone investigation is in 1988.

The 1987 output of the limestone resource inventory project consists of: (1a) Draft report and accompanying 1:10 000 scale maps concerning various aspects of Carboniferous and Precambrian limestone deposits in the Province; (1b) Computerized sample inventory having related information on more than 1500 entries; (1c) Summary of relevant information for 400 drill holes, and setting up of a computerized data retrieval system; (1d) Preparation of a deposit classification and rating scheme for Carboniferous and Precambrian limestones to indicate future development potential. (2) A study concerning the 'Limestone industry in New Brunswick' was completed and is available as Open File Reports 87-6 and 87-7.

PEAT[13] Applications continued to be received for Peatland Exploration licences. A paper entitled "Geology, Processing and Marketing of Peat in New Brunswick" was presented at the Annual General Meeting of the Canadian Institute of Mining and Metallurgy in Toronto in May, 1987. A poster

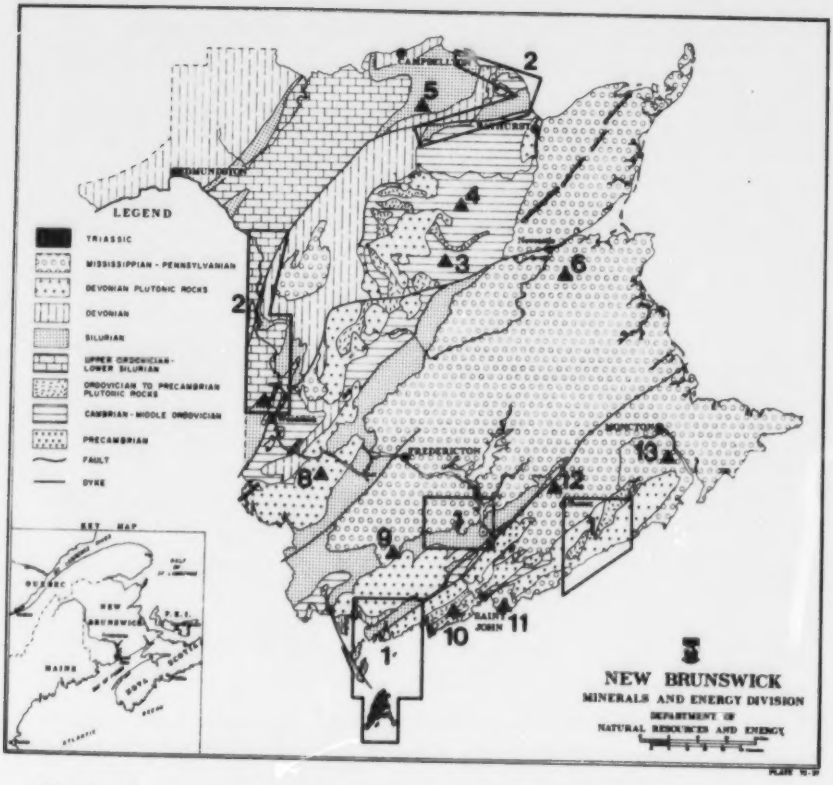

Figure 9. Areas in which Mineral Development Branch projects were conducted in 1987: (1) aggregate resource mapping; (2) limestone investigations; (3) custom mill for chemical extraction of refractory gold ores; (4) custom mill for chemical upgrading of bulk sulphide concentrates; (5) physical and chemical extraction of phosphate and rare earths; (6) chemical refinery for low-tonnage, high-revenue metals (e.g., rare earths); (7) dump leach extraction of manganese; (8) antimony oxide production plant; (9) ammonium paratungstate production facility; (10) synthetic magnesium oxide production; (11) heap leach of gold ores; (12) production of potassium sulfate; (13) physical upgrading of ilmenite (titanium).

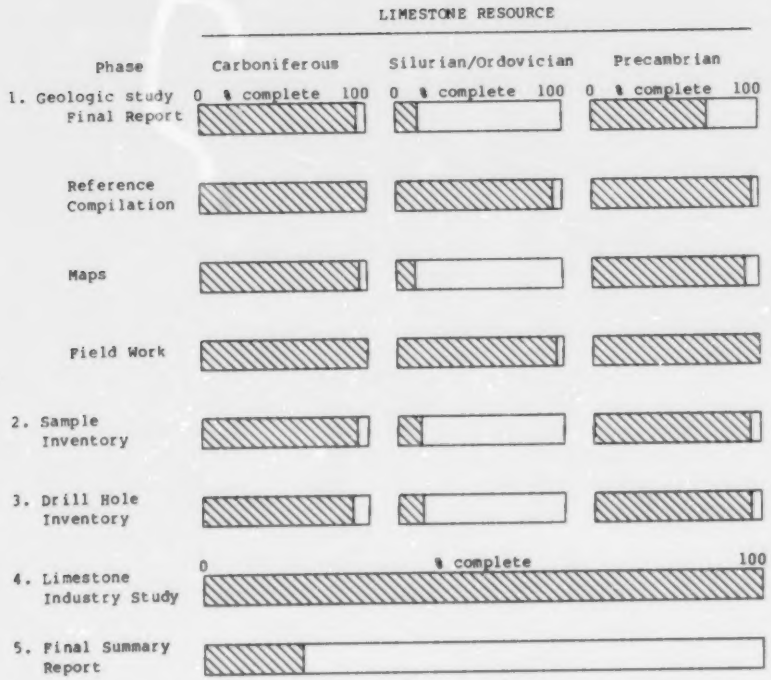

Figure 10. Status of the limestone resource inventory project in 1987.

display entitled "The New Brunswick Peat Industry" was prepared for Wetlands/Peatlands Symposium '87 held in Edmonton in August and was also presented at the Division's annual Review of Activities in Fredericton.

The Mineral Development Branch continued to actively support the Peat Research and Development Centre located in Shippagan. Under the current Canada-New Brunswick Mineral Development Agreement, a contract was awarded to the research centre to review the uses of peat as a soil additive in the agricultural sector. Results of this study were published as Open File Report 87-8.

A peat market study tendered under the current Canada-New Brunswick Mineral Development Agreement and awarded to The Coopers and Lybrand Consulting Group was in preparation. The objective of the project is to review the present peat moss market in North America and selected overseas countries, and to evaluate the potential for further development of these markets. The final report is to be completed on March 31, 1988.

COASTAL ZONE[13] The first segment of an 11-hour colour video recording of the New Brunswick coastline was released by the Geological Survey of Canada as Open File 1740 and is entitled "The coast of New Brunswick from Richibucto Cape to Point Escuminac," by J. Thibault and D. Frobel. Other one-hour segments are in preparation.

AGGREGATE MATERIALS[12,14] In New Brunswick, the rights to quarriable substances, including ordinary stone, building or construction stone, sand, gravel, clay and soil, are vested in the landowner who thereby controls extraction activities. Approximately 42% of the land area of the Province is Crown land. Removal of aggregate materials from Crown lands is regulated under the Quarriable Substances Act, with permits being issued by the Minister of Natural Resources and Energy.

Production of aggregates from Crown lands in 1987 was 2 863 457 t with a value of $3 200 000, compared to 2 807 718 t with a value of $4 200 000 in 1986.

Process Studies Group[15]

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Telephone: 453-2206

The Process Studies Group staff responsible for administration of various development projects include: J. Dean Thibault, Process Engineer; Robert D. Harris, Project Engineer (MDA); Brent H. Blizzard, Metallurgical Engineering Technician (MDA); Mitch O'Donnell, Chemical Engineering Technician (MDA).

The Process Studies Group (PSG) was initiated to provide information on process development alternatives for the Province's mineral resource industry. To gain full economic benefit from the diverse mineral resources of New Brunswick, technical and economic incubation studies have been provided to identify opportunities for development. In the field of process development, the Process Studies Group specializes in flowsheet investigations and feasibility analysis. Technical and economic factors have been identified for developers and operators in New Brunswick who must meet specific market specifications.

The projects managed by the PSG include innovative process development and evaluation of technology. Hence, process investigations are administered on known technology or technology at the leading edge, which may provide a practical commercial method to treat provincial resources. Fundamental research is not carried out on projects; however, the need for fundamental research is identified. To establish the potential for commercial development, technical studies are carried out by bench-scale flowsheet simulation and/or computer simulation and the data are used for a preliminary economic feasibility.

Projects are identified through discussion with the private sector and consultants specializing in process development and marketing trends. With each project, a collation of technical literature, and economic and market conditions is carried out to provide guidelines for process studies. Laboratory studies are necessary to characterize ores

and concentrates because of their diverse nature. Optimization studies are not carried out because they do not fit the seed development concept. If optimization is required, recommendations are given for constructive large-scale research and development.

Various opportunities for commercial development have been outlined in Figure 9 and Table 1 based on studies administered by PSG. These concepts are at various stages of development (e.g., some concepts require further identification of the resource tonnage and grade). Preliminary feasibility studies of these concepts are presently being carried out.

Mine Engineering Sector[16]

Mining Engineer: Samuel K. McEwan, P. Eng.
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Telephone: 453-2206

The Mine Engineering Sector is responsible for work of both a specific and general nature relating to the mining industry of New Brunswick.

Responsibilities include the monitoring of mining activities; compilation and analysis of mining statistics; administration of the Mining Act; review and evaluation of feasibility reports, annual mining plans, and reclamation reports; and administration of Mineral Development Agreement (MDA) projects.

In addition to these specific tasks the Mine Engineering Section liaised with the Federal government and other provincial governments on matters related to the mining industry. These activities have been carried out by S.K. McEwan since May, 1987.

RECLAMATION[17] One site clean-up plan and four reclamation plans were received in 1987. The reclamation plans involved sulphide, coal, and gold mining operations. The site clean-up plan was specific to an oil and PCB spill from a damaged hydro transformer at an abandoned mine site.

The mining companies maintained their rate of reclamation on disturbed land in accordance with their submitted schedules.

The department continued involvement with the Reactive Acid Tailings Stabilization (RATS) programme. RATS is a cooperative programme involving industry and the federal and provincial governments. It researches technologies to manage or prevent acid generation from mine sulphide wastes. The Department of Natural Resources and Energy has a representative on both the Steering Committee and the Technical Working Group. The research plan for the RATS programme has been published as CANMET Special Publication SP 88-3.

TABLE 1: COMMERCIAL DEVELOPMENT OPPORTUNITIES FOR NEW BRUNSWICK'S MINERAL RESOURCES

(Diversifying the Mineral Industry)

DEVELOPMENT CONCEPT	DEVELOPMENT PROFILE	ESTIMATED INVESTMENT/JOBS	STATUS/LIMITATIONS
Custom mill for refractory gold ore and concentrates Figure 9 (3)	Centralized processing plant: to treat gold ores and concentrates that are considered refractory (gold not recovered by conventional cyanization). A limitation to the development of refractory gold ore deposits is the large capital outlay for a chemical processing plant. Local installations: This concept looks at the possibility of localized physical upgrading of ore and sale of concentrate to custom mill. Product: precious metal, dore	Central plant for chemical processing: $50-100 million/50-100 jobs to produce 10-15,000 oz. of Au per year Local installations for physical upgrade: $10-50 million/20-50 jobs depending on size of operation NOTE: Various physical upgrading plants may be established to provide local concentrates containing 20-40 g/t Au.	Ore types have been identified; technology for custom processing is to be identified along with various resource-based tonnages.
Bulk sulphide for custom mill Figure 9 (4)	Centralized base-metal chemical processing plant capable of converting bulk sulphide concentrates (produced at separate locations within the province) into refined zinc metal and various by-products. Product: high-purity zinc metal, chemical derivatives of lead and copper (possibly silver and gold)	Base-metal processing plant: $125-190 million/150-200 jobs producing 100 000 t/yr Zn	Various processing methods have been developed and some piloted. The technology for treating complex sulphide concentrates must allow for flexibility in feedstock grade, and must have an attractive profitability and limited environmental constraints.

DEVELOPMENT CONCEPT	DEVELOPMENT PROFILE	ESTIMATED INVESTMENT/JOBS	STATUS/LIMITATIONS
Phosphate and rare earth extraction plant Figure 9 (5)	Physical upgrading of phosphate (apatite) and chemical extraction of rare earths to produce phosphate rock, yttrium, rare earth concentrates Product: Phosphate for fertilizer and rare earth concentrates (chemical, electronics)	Phosphate beneficiation plant: $50-75 million Rare-earth chemical extraction plant: $5-15 million To treat 200 000 t/year of ore. A total of 50-100 jobs.	The Benjamin River apatite occurrence requires further resource evaluation. Overall tonnage and grades of P_2O_5, Y_2O_3 and REO* have not been determined. Concepts of extraction technology were identified but require further development.
Rare earth metal refinery Figure 9 (6)	Chemical refinery: to treat REO* concentrates (i.e., 60% REO* feedstock) to produce high-purity metals of yttrium, lanthanum, cesium, neodymium, samarium, etc. Refinery would be capable of treating concentrates shipped from the Great Lakes or international sources. Product: Refined lanthanide metals (electronics)	Processing equipment with significant automation: $20-50 million/50-75 jobs to treat about 1000 t/y of concentrate.	Further development required to identify an ideal upgrading process, based on the mineralogy of the ore and/or concentrates.
Chemical extraction of manganese ores Figure 9 (7)	Chemical treatment facility: using low-cost dump leaching to extract manganese from crushed ore and/or a processing method that will enable the leaching agent to be recycled Product: manganese dioxide (batteries), possibly manganese sulphate, manganese hydroxide (chemical)	Treatment facility: $50-100 million/50-75 jobs to produce 10 000 t/year of Mn contained in product.	Bench-scale work and preliminary capital operating cost identified. Technology must be developed to produce high-purity solutions for production of MnO_2. Operating costs must be kept low because of low ore grade.
Antimony oxide production plant Figure 9 (8)	Chemical processing plant: capable of producing high-purity antimony oxide from antimony sulfide concentrates. Product: antimony oxides (chemical, flame retardants)	Processing plant: $5-10 million/20-25 jobs producing 10,000 lb. of oxide annually	Preliminary bench-scale work on processing technology. Optimization of processing method and establishing a market for products.

Ammonium paratungstate (APT) production plant Figure 9 (9)	Physical and chemical processing plant: to produce APT from Mount Pleasant tungsten ores. Plant to include gravity separation circuit and chemical treatment plant to produce APT rather than upgrading and sale of wolframite ($FeWO_4$) concentrates. Product: APT (metal and alloy industries)	Gravity plant: $15-20 million Chemical plant: $5-10 million Treating 175 000 t of ore and creating 100-150 jobs in total.	Preliminary bench-scale work on processing methods. Identify technology for purifying leach solutions. Price of metal at an all-time low.
Synthetic magnesium oxide production plant Figure 9 (10)	Chemical processing plant: to recover magnesium from dolomitic ores ($(Ca,Mg)CO_3$) and produce high-purity synthetic magnesium oxide. Magnesium (50%) is also derived from seawater. Product: MgO (chemical, refractories, metal, and electronics	Processing plant: $30-50 million/50-75 jobs to treat 145 000 t of dolomite and 900 000 t of seawater annually	Commercial technology available; more development needed to optimize operating conditions. Calcium silicates in ore limit purity of products. Markets to be developed.
Heap leach of Cape Spencer ores Figure 9 (11)	Chemical treatment facility: using low-cost heap leach method to extract gold from ore.	Treatment facility: $3-5 million/20-30 jobs leaching 200 000 t of ore annually	Ore reserves being identified; technology to recover gold and maintain environmental standards for effluents being carried out.
Potassium sulphate production plant Figure 9 (12)	Chemical processing plant: converting potash to potassium sulphate using gypsum as source of sulphate. Calcium chloride is by-product. Product: potassium sulphate for fertilizer and calcium chloride as road salt	Processing plant: $15-20 million/40-60 jobs to produce 30 000 t/year of potassium sulphate	Technology bench tested; further testing being done to develop optimum operating conditions. Product markets to be developed.
Titanium upgrading mill Figure 9 (13)	Physical upgrading plant: to produce ilmenite concentrate from hard-rock hematite-ilmenite ores. Possibility of producing chemical-grade TiO_2 pigment from ilmenite concentrate by a combination of gravity, magnetic separation, and flotation. Product: ilmenite concentrate used in pigment	Beneficiation plant: $20-50 million/50-75 jobs to treat 725 000 t of ore	Ore reserves and method of upgrading to be identified. Markets to be identified. Other possible sources of titanium-bearing rocks to be identified (i.e., anatase or rutile).

* rare earth oxides

Mineral Lands Section[18]

Chief Mining Recorder: Eugene V. Jackson
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The Mineral Lands Section processes and maintains records pertaining to the disposition of Crown-owned mineral rights. Mining claims are recorded and prospecting licences are sold in Fredericton and at the regional offices in Bathurst and Sussex.

Mineral Lands staff in 1987 consisted of E.V. Jackson, Chief Mining Recorder (Figure 11); F.J. Edney, Acting Deputy Recorder; and P. Evans, Cartographic Technician (casual). On April 30, 1987, Mr. Douglas D.W. Bailey retired as Chief Mining Recorder (Figure 12). He had worked for the Department for 34 years.

The number of claims staked in each of the metallogenic zones is illustrated in Figure 13 and the total annual expenditures reported for assessment credit (1954-1987) are given in Figure 14. Table 2 presents mineral lands statistics for 1987.

The project of entering mineral claims data into the computer was completed during the year.

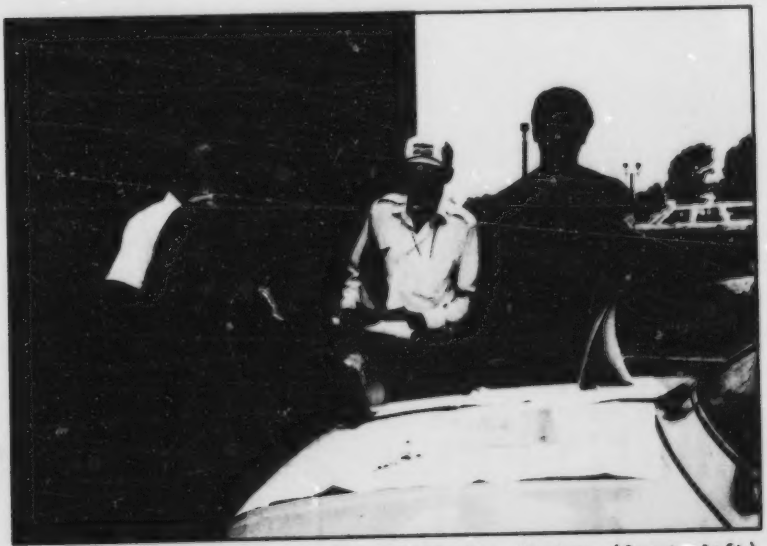

Figure 11. Exploration geologists Ken Whaley (front left), Wayne Stewart (centre) and Derek Brown (right) discuss with the Mining Recorder, Eugene Jackson (back left), claims staked as a result of a recently released Federal (MDA) geochemical survey.

Figure 12. Ron Shaw presents Douglas Bailey, retiring Mining Recorder, with a gift at Mr. Bailey's retirement dinner.

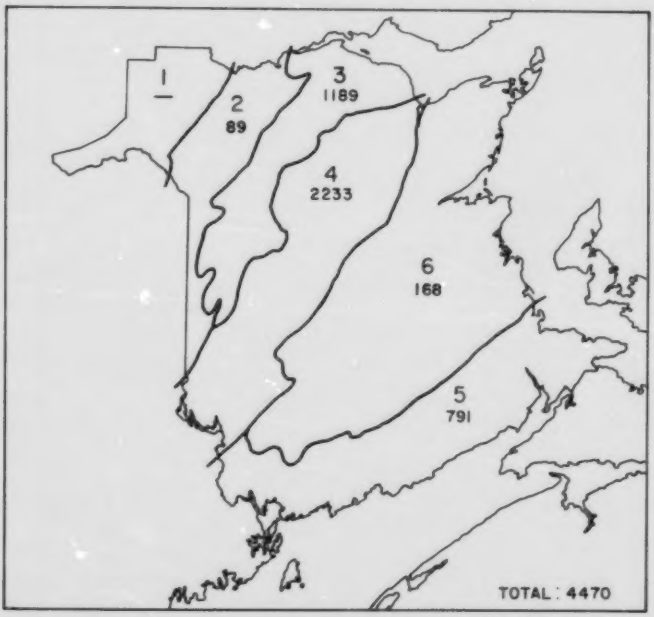

Figure 13. Number of claims staked by metallogenic region in 1987.

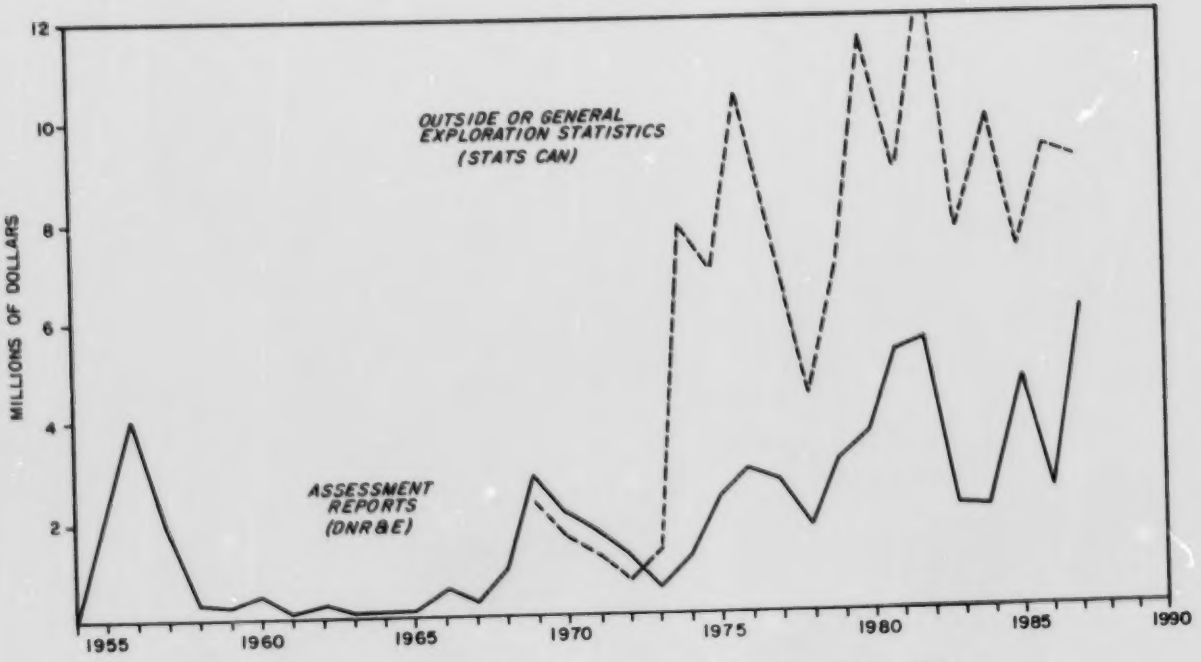

Figure 14. Total annual expenditures reported for assessment credit, 1954-1987.

Table 2

Mineral Lands Statistics, 1987

	No.	Claim Equivalent	Hectares	% Inc. Over Prev. Year (Decrease)
Prospecting Licences Sold[3]	197	-	-	(36.6)
Claims Recorded	4 494	4 494	71 904	62
Claims Renewed	6 050	6 050	96 800	(1.4)
Claims Expired	2 908	2 908	46 528	(0.5)
Claims in Effect[1]	10 544	10 544	168 704	(16.4)
Mining Licences Issued[2]	0	0	0	
Mining Licences Renewed	110	4 174	66 784	(8)
Mining Licences Expired	15	473	7 568	(53)
Mining Licences in Effect[1]	110	4 174	66 784	(10)
Coal Licences in Effect[1]	1	5 818	93 088	0
Potash Leases in Effect[1]	3	2 355	38 130	0
Other Leases in Effect[1]	4	437	7 106	0
Total Claims and Claim Equivalents in Effect	-	23 328	373 248	4.5
Oil-Gas Licences	32	-	762 794	(4)[4]
Oil-Gas Leases	1	-	2 154	(95)[4]
Bituminous Shale Licences	1	-	8 998	0
Bituminous Shale Development Permits	-	-	-	-
Bituminous Shale Leases	1	-	1 439	0
Underground Storage Licences	-	-	-	-
Underground Storage Leases	-	-	-	-
Quarry Permits	347	-	-	22
Quarry Leases	7	-	481.27	0
Peat Licences (issued 1987)	2	-	1 777	100
Peat Leases[1] (in effect at year's end)	25	-	9 662	0
Potash Exploration Reservations	-	-	-	-

	No.	Depth (m)	Value ($)
Assessment Reports Submitted	115		
Value of Assessment Reports Received			6 000 000
Total Drilling (Metres)		50 000	
Drilling Value			2 800 536
No. of Holes	359		
Potash Exploration Expenditure			-
No. of Holes	-		
Total Depth		-	
Oil-Gas Exploration Expenditure			70 000
No. of Holes	-		
Total Depth		-	
Bituminous Shale Expenditure			8 000

[1] In effect at year's end
[2] After July 6, 1986, mining licences no longer issued
[3] Prospecting licences are now issued for life
[4] Based on number of hectares

MINE TAXATION[19]

Mine Assessor: Wayne R. Carr
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The Mine Assessor, W.R. Carr, is responsible for the collection of all revenue due the Province from mineral taxation and royalties. On April 1, 1987, the position of Mine Assessor was transferred from the Mineral Development Branch of the Minerals and Energy Division to the Financial Services section of Departmental Support Services.

The mines subject to the Metallic Minerals Tax Act submit annual tax returns that are reviewed, and additional assessments are issued if necessary. Taxes due under the Metallic Minerals Tax Act are monitored and collected on a regular basis as required by the Act.

Royalties from coal and natural gas are collected monthly, whereas royalties from potash, salt and oil are collected quarterly, and royalties from peat moss, sand and gravel are collected semi-annually.

The Mine Assessors from each province meet annually to discuss topics related to taxation, royalties, and legislation.

MINING COMMISSIONER'S REPORT[20]

Mining Commissioner: William I. Spence
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Telephone: 328-2105

Mr. Spence retired as Mining Commissioner in March, 1987. He has held the position since 1977. Between 1944 and 1977, Mr. Spence had held various positions in the Department.

No disputes were heard during the calendar year 1987.

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PLATES

MP 79-50g — Arsenic, antimony, barium and gold content of stream and spring sediments, Riley Brook East (21 O/3E). J.L. Davies. (1987). Scale: 1:50 000.

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MP 80-102(R) — South half (parts of 21 G/10,11,12,13,14,15)

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MP 84-11g — Arsenic, antimony, barium and gold content of stream sediments. Riley Brook, sheet f (21 O/3f). J.L. Davies. (1987). Scale: 1:20 000.

Granular aggregate resource maps. Scale: 1:50 000.

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MP 87-14B — Index to New Brunswick granular aggregate inventory map coverage. A.A. Seaman. (1987). (8 1/2" x 11").

MP 87-15 — West-east stratigraphic section through the Stoney Creek field (21 H/14 and 21 I/2,3,7). D.C. Carter and R.K. Pickerill. (1980).

MP 87-16 — Geology and composite stratigraphic section of the Albert Formation, McQuade Bk., Indian Mt. and North River areas (21 H/15). D.C. Carter and R.K. Pickerill. (1982). Scale: 1:50 000.

MP 87-17 — Uranium occurrences in New Brunswick. Compiled by D.V. Venugopal. (1985). See Geological Survey of Canada Open File 1444. (Canada - New Brunswick Mineral Development Agreement 1984-89). Scale: 1:500 000.

MP 87-18 — Peatland regions of New Brunswick. D. Keys. (1983). Scale: 1:500 000.

MP 87-19 — Distribution of peatlands and plate numbers of 1:250 000 scale index maps. L. Keys. (1983). Scale: 1:500 000.

MP 87-20 — Geology of St. George - Pennfield area (21 G/2). P.W. Hay and J.D. Grant. (1967). See MS 68-1. Scale: 1 inch equals 1/2 mile.

MP 87-21 — Geology of Pocologan - Seven Mile Lake area (parts of 21 G/1,2,7,8). P.W. Hay and J.D. Grant. (1967). See MS 68-1. Scale: 1 inch equals 1/2 mile.

Regional stream sediment and water geochemical reconnaissance data, southern New Brunswick (Sheet A - Parts of 21 H/6,10,11,14,15; Sheet B - Parts of 21 G/1,8, 21 H/4,5,12). Geological Survey of Canada. (1986). See G.S.C. Open File 1355. Scale: 1:100 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 87-22A — Sample location.
MP 87-22B — Sample location.
MP 87-23A — Copper (ppm).
MP 87-23B — Copper (ppm).
MP 87-24A — Lead (ppm).
MP 87-24B — Lead (ppm).
MP 87-25A — Zinc (ppm).
MP 87-25B — Zinc (ppm).
MP 87-26A — Manganese (ppm).
MP 87-26B — Manganese (ppm).
MP 87-27A — Iron (%).
MP 87-27B — Iron (%).
MP 87-28A — Antimony (ppm).
MP 87-28B — Antimony (ppm).

Regional stream sediment and water geochemical reconnaissance data, southern New Brunswick (Sheet A - Parts of 21 H/6,10,11,14,15; Sheet B - Parts of 21 G/1,8, 21 H/4,5,12). Geological Survey of Canada. (1986). See G.S.C. Open File 1355. Scale: 1:100 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 87-29A	Tungsten (ppm).
MP 87-29B	Tungsten (ppm).
MP 87-30A	Molybdenum (ppm).
MP 87-30B	Molybdenum (ppm).
MP 87-31A	Silver (ppm).
MP 87-31B	Silver (ppm).
MP 87-32A	Cobalt (ppm).
MP 87-32B	Cobalt (ppm).
MP 87-33A	Tin (ppm).
MP 87-33B	Tin (ppm).
MP 87-34A	Nickel (ppm).
MP 87-34B	Nickel (ppm).
MP 87-35A	Arsenic (ppm).
MP 87-35B	Arsenic (ppm).
MP 87-36A	Uranium (ppm).
MP 87-36B	Uranium (ppm).
MP 87-37A	Vanadium (ppm).
MP 87-37B	Vanadium (ppm).
MP 87-38A	Cadmium (ppm).
MP 87-38B	Cadmium (ppm).
MP 87-39A	Barium (ppm).
MP 87-39B	Barium (ppm).
MP 87-40A	Fluorine (ppm).
MP 87-40B	Fluorine (ppm).
MP 87-41A	Gold (ppb).
MP 87-41B	Gold (ppb).
MP 87-42A	Mercury (ppb).
MP 87-42B	Mercury (ppb).
MP 87-43A	Uranium in water (ppb).
MP 87-43B	Uranium in water (ppb).
MP 87-44A	Fluorine in water (ppb).
MP 87-44B	Fluorine in water (ppb).
MP 87-45A	pH in water.
MP 87-45B	pH in water.
MP 87-46A	Loss on ignition %.
MP 87-46B	Loss on ignition %.

Surficial geology and till geochemistry maps of the Upsalquitch Forks (21 O/10) map area. A.G. Pronk. (1986). See PM 87-47. Scale: 1:50 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 87-47A	Surficial geology
MP 87-47B	Au and As values in till
MP 87-47C	Cu, Pb, Zn, Ag, Sb values in till
MP 87-47D	Co, Ni, Mn, Fe, Mo values in till

MP 87-48 Arsenic-antimony-barium-gold content of stream sediments, Charlo (NTS 21 O/16). J.L. Davies. (1986 analyses of 1973 samples). Scale: 1:50 000.

MP 87-49 Arsenic-antimony-barium-gold content of stream sediments, Nepisiguit Lakes (NTS 21 O/7). J.L. Davies. (1986 analyses of 1976, 1979, 1981, and 1982 samples). Scale: 1:50 000.

MP 87-50 N.T.S. index map of New Brunswick. (1987). Scale: 1:500 000.

MP 87-50(R) N.T.S. index map of New Brunswick. (1987). Scale: 1:730 000. Reduction of MP 87-50; to accompany MSC 6.

MP 87-51A Preliminary map. Bedrock geological compilation of parts of the Pointe Verte (21 P/13) map area. G. Philpott. (1987). Scale: 1:20 000 (Canada - New Brunswick Mineral Development Agreement 1984-1989).

MP 87-51B Preliminary map. Bedrock geological compilation of parts of the Bathurst (21 P/12) map area. G. Philpott. (1987). Scale: 1:20 000. (Canada - New Brunswick Mineral Development Agreement 1984-1989).

MP 87-52 Preliminary geology map. Bradley Brook, Millstream River area (21 P/12). G. Philpott. (1987). Scale: 1:2500. (Canada - New Brunswick Mineral Development Agreement 1984-1989).

MP 87-53 Preliminary map. Bedrock geological compilation of the Rocky Brook area (21 P/12). G. Philpott. (1987). Scale: 1:4800. (Canada - New Brunswick Mineral Development Agreement 1984-1989).

MP 87-54 Preliminary geology map. Stephens Brook, Lavigne Brook area (21 P/12). G. Philpott. (1987). Scale: 1:2500. (Canada - New Brunswick Mineral Development Agreement 1984-1989).

MP 87-55 Geology of the Dungarvon and Sisters Brook granites (parts of 21 J/10 and J/15). W.W. Gardiner and K. Garnett. (1986). Scale: 1:20 000. (Canada - New Brunswick Mineral Development Agreement 1984-1989).

MP 87-56 Geology of Little Dungarvon River and Four Mile Brook showings, central New Brunswick (part of 21 J/10E). W.W. Gardiner. (1986). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-1989).

MP 87-57 Geology of the Trout Lake and Rocky Brook granites (parts of 21 J/10). W.W. Gardiner and K. Garnett. (1986). Scale: 1:20 000. (Canada - New Brunswick Mineral Development Agreement 1984-1989).

MP 87-58 Geology of Trout Lake showings, central New Brunswick (part of 21 J/10E). W.W. Gardiner. (1986). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-1989).

MP 87-59	Geology of Bathurst-Nepisiguit Falls, New Brunswick (part of 21 P/5,12). Compiled by J. Carr. (1986). Scale: 1:50 000.
MP 87-60	Till geochemistry of Sisson Branch Reservoir (21 O/6). J. Thibault. (1983). Scale: 1:50 000.
	Geological compilation showing rock sample locations, Jacquet River project. D.M. Burton. (1987). See OF 87-18. Scale: 1:20 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).
MP 87-61A	N.T.S. 21 O/16a,b
MP 87-61B	N.T.S. 21 O/9g
MP 87-61C	N.T.S. 21 O/9e,f
MP 87-61D	N.T.S. 21 O/10g,h
MP 87-61E	N.T.S. 21 O/10a,b
MP 87-62	Geology of Albert Mines (21 H/15). C. St. Peter. (1987). Scale: 1:2500.
MP 87-62(R)	Reduction of MP 87-62. Scale: 1:5000.
	Geophysical series maps of airborne gamma-ray spectrometric, VLF, and magnetic surveys, Campbellton-Bathurst area, New Brunswick. Geological Survey of Canada. (1987). Scale: 1:50 000 unless otherwise stated. (Canada - New Brunswick Mineral Development Agreement 1984-89).
MP 87-63A	K %, Tetagouche Lakes (21 O/9).
MP 87-63B	Equivalent U/equivalent Th, Tetagouche Lakes (21 O/9).
MP 87-63C	(Equivalent Th/K)10^4, Tetagouche Lakes (21 O/9).
MP 87-63D	(Equivalent U/K)10^4, Tetagouche Lakes (21 O/9).
MP 87-63E	Equivalent Th ppm, Tetagouche Lakes (21 O/9).
MP 87-63F	Equivalent U ppm, Tetagouche Lakes (21 O/9).
MP 87-63G	Total count Ur, Tetagouche Lakes (21 O/9).
MP 87-64A	K %, Upsalquitch Forks (21 O/10).
MP 87-64B	Equivalent U/equivalent Th, Upsalquitch Forks (21 O/10).
MP 87-64C	(Equivalent Th/K)10^4, Upsalquitch Forks (21 O/10).
MP 87-64D	(Equivalent U/K)10^4, Upsalquitch Forks (21 O/10).
MP 87-64E	Equivalent Th ppm, Upsalquitch Forks (21 O/10).
MP 87-64F	Equivalent U ppm, Upsalquitch Forks (21 O/10).
MP 87-64G	Total count Ur, Upsalquitch Forks (21 O/10).
MP 87-65A	K %, Atholville (21 O/15) and Oak Bay (22 B/2).
MP 87-65B	Equivalent U/equivalent Th, Atholville (21 O/15) and Oak Bay (22 B/2).
MP 87-65C	(Equivalent Th/K)10^4, Atholville (21 O/15) and Oak Bay (22 B/2).
MP 87-65D	(Equivalent U/K)10^4, Atholville (21 O/15) and Oak Bay (22 B/2).
MP 87-65E	Equivalent Th ppm, Atholville (21 O/15) and Oak Bay (22 B/2).

Geophysical series maps of airborne gamma-ray spectrometric, VLF, and magnetic surveys, Campbellton-Bathurst area, New Brunswick. Geological Survey of Canada. (1987). Scale: 1:50 000 unless otherwise stated. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 87-65F Equivalent U ppm, Atholville (21 O/15) and Oak Bay (22 B/2).

MP 87-65G Total count Ur, Atholville (21 O/15) and Oak Bay (22 B/2).

MP 87-66A K %, Charlo (21 O/16) and Escuminac (22 B/1).

MP 87-66B Equivalent U/equivalent Th, Charlo (21 O/16) and Escuminac (22 B/1).

MP 87-66C (Equivalent Th/K)10^4, Charlo (21 O/16) and Escuminac (22 B/1).

MP 87-66D (Equivalent U/K)10^4, Charlo (21 O/16) and Escuminac (22 B/1).

MP 87-66E Equivalent Th ppm, Charlo (21 O/16) and Escuminac (22 B/1).

MP 87-66F Equivalent U ppm, Charlo (21 O/16) and Escuminac (22 B/1).

MP 87-66G Total count Ur, Charlo (21 O/16) and Escuminac (22 B/1).

MP 87-67A K %, Nepisiguit Falls (21 P/5).

MP 87-67B Equivalent U/equivalent Th, Nepisiguit Falls (21 P/5).

MP 87-67C (Equivalent Th/K)10^4, Nepisiguit Falls (21 P/5).

MP 87-67D (Equivalent U/K)10^4, Nepisiguit Falls (21 P/5).

MP 87-67E Equivalent Th ppm, Nepisiguit Falls (21 P/5).

MP 87-67F Equivalent U ppm, Nepisiguit Falls (21 P/5).

MP 87-67G Total count Ur, Nepisiguit Falls (21 P/5).

MP 87-68A K %, Bathurst (21 P/12).

MP 87-68B Equivalent U/equivalent Th, Bathurst (21 P/12).

MP 87-68C (Equivalent Th/K)10^4, Bathurst (21 P/12).

MP 87-68D (Equivalent U/K)10^4, Bathurst (21 P/12).

MP 87-68E Equivalent Th ppm, Bathurst (21 P/12).

MP 87-68F Equivalent U ppm, Bathurst (21 P/12).

MP 87-68G Total count Ur, Bathurst (21 P/12).

MP 87-69A K %, Pointe Verte (21 P/13).

MP 87-69B Equivalent U/equivalent Th, Pointe Verte (21 P/13).

MP 87-69C (Equivalent Th/K)10^4, Pointe Verte (21 P/13).

MP 87-69D (Equivalent U/K)10^4, Pointe Verte (21 P/13).

MP 87-69E Equivalent Th ppm, Pointe Verte (21 P/13).

MP 87-69F Equivalent U ppm, Pointe Verte (21 P/13).

MP 87-69G Total count Ur, Pointe Verte (21 P/13).

MP 87-70A VLF, total field profile map of the entire Campbellton-Bathurst survey area (21 O, 21 P). Scale: 1:250 000.

MP 87-70B VLF, quadrature profile map of the entire Campbellton-Bathurst survey area (21 O, 21 P). Scale: 1:250 000.

MP 87-71 Stoney Creek area well data map (21 H/15). Last, Kloepfer Ltd. (1975). Scale: 1 inch equals 1000 feet.

MP 87-72 Stoney Creek area pressure map (21 H/15). Last, Kloepfer Ltd. (1975). Scale: 1 inch equals 1000 feet.

MP 87-73 Stoney Creek area cumulative production (21 H/15). Last, Kloepfer Ltd. (1975). Scale: 1 inch equals 1000 feet.

MP 87-74 Stoney Creek area location of cross sections (21 H/15). Last, Kloepfer Ltd. (1975). Scale: 1 inch equals 1000 feet.

MP 87-74A Stoney Creek area structure section A-A' (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-74B Stoney Creek area structure section B-B' (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-74C Stoney Creek area structure section C-C' (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-74D Stoney Creek area structure section D-D' (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-74E Stoney Creek area structure section E-E' (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-74F Stoney Creek area structure section F-F' (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-74G Stoney Creek area structure section G-G' (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-74H Stoney Creek area structure section H-H' (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-74J Stoney Creek area structure section J-J' (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-74K Stoney Creek area stratigraphic section K-K' showing all logs run (21 H/15). Compilation by Last, Kloepfer Ltd. (1975). Scale unknown.

MP 87-75 Stoney Creek area, structure, top of group 6 (21 H/15). Last, Kloepfer Ltd. (1975). Scale: 1 inch equals 1000 feet.

MP 87-76 Stoney Creek area well status (21 H/15). Last, Kloepfer Ltd. (1975). Scale: 1 inch equals 1000 feet.

Base maps of 21 O/10 (Upsalquitch Forks). Produced by Maritime Resource Management Service Inc. (May 1987). Scale: 1:10 000. (Canada - New Brunswick Mineral Development Agreement 1984-89).

MP 87-77	21 O/10-101	MP 87-90	21 O/10-304
MP 87-78	21 O/10-102	MP 87-91	21 O/10-305
MP 87-79	21 O/10-103	MP 87-92	21 O/10-401
MP 87-80	21 O/10-104	MP 87-93	21 O/10-402
MP 87-81	21 O/10-105	MP 87-94	21 O/10-403
MP 87-82	21 O/10-201	MP 87-95	21 O/10-404
MP 87-83	21 O/10-202	MP 87-96	21 O/10-405
MP 87-84	21 O/10-203	MP 87-97	21 O/10-501
MP 87-85	21 O/10-204	MP 87-98	21 O/10-502
MP 87-86	21 O/10-205	MP 87-99	21 O/10-503
MP 87-87	21 O/10-301	MP 87-100	21 O/10-504
MP 87-88	21 O/10-302	MP 87-101	21 O/10-505
MP 87-89	21 O/10-303		

MP 87-102 Geology of the Moncton subbasin (21 H,I). C. St. Peter. (1987). Scale: 1:125 000.

MP 87-103 Figure 4. Tectonic stratigraphic zonation of the northern Appalachians. H. Williams. (1979). See OF 87-14. Approximate scale: 1:3 630 000.

MP 87-104 Figure 15. Isopach map of the Horton Group. Compiled by R.D. Howie and M.S. Barss. (1974). See OF 87-14. Scale: 1:2 000 000.

MP 87-105 Figure 17. Isopach map of the Windsor Group. Compiled by R.D. Howie and M.S. Barss. (1974). See OF 87-14. Scale: 1:2 000 000.

MP 87-106 Figure 19. Isopach map of the Canso-Riversdale groups. Compiled by R.D. Howie and M.S. Barss. (1974). See OF 87-14. Scale: 1:2 000 000.

MP 87-107 Figure 21. Isopach map of the Cumberland-Pictou groups. Compiled by R.D. Howie and M.S. Barss. (1974). See OF 87-14. Scale: 1:2 000 000.

MP 87-108 Till geochemical surveys index for New Brunswick. Compiled by L.G. Johnson. (1987). Scale: 1:500 000.

CHAPTER 2. MINERAL EXPLORATION IN NEW BRUNSWICK

METALLIC MINERALS

SUMMARY OF EXPLORATION ACTIVITY[4,5] Precious metals were again the focus of exploration activity in 1987. A large portion of the exploration was carried out by Acadia Mineral Ventures Limited (and its associates), Lacana Mining Corporation Limited, Brunswick Mining and Smelting Corporation Limited (including Noranda Exploration Company Limited), and Granges Exploration Limited. Other companies that were active include Caribou New Brunswick Mining Ltd. (see Anaconda Canada Ltd. claims), Dejour Mines Limited, Four Seasons Resources Limited, Heron Mines Limited, Northumberland Mines Limited, Northeast Exploration Services Ltd., Sharpe Energy and Resources Limited, Stratabound Minerals Corporation (see Ken Whaley claims), and Tintina Mines Limited. Several prospectors also were active. (Figure 15)

Until this year, gold exploration in northern New Brunswick had been focused upon an east-northeasterly trending belt that extends from Baie des Chaleurs to Upsalquitch River, about 65 km west of Bathurst. However, a recent discovery by Lacana and new geochemical data released by the Minerals and Energy Division have focused on alteration in the Silurian-Devonian volcanic belt that stretches from Dalhousie to Plaster Rock. A gold discovery by Granges and antimony-silver discoveries by Acadia (Falconbridge) sparked renewed interest in the Miramichi terrane as well.

Gold exploration received most attention in southern New Brunswick in 1987. The first discovery of platinum occurrences of economic interest also activated staking in the region.

The most important area for gold exploration remained the Bay of Fundy coastal zone, where deposits are associated with major thrust faults. Gordex Minerals Limited discovered a new gold-bearing zone at Cape Spencer. Mispec Resources Inc. continued delineation of its gold-bearing zone northeast and along strike of the Gordex deposit.

Several discoveries of economic interest were made in the Pendar Brook gold zone northeast of the Saint George Batholith. In addition to several prospectors, the companies most active in this area were Noranda Exploration Company Limited, Goldfluor Exploration Limited and Grand Empire Exploration Limited. Pacific Coast Mines Inc. discovered several gold occurrences of economic interest along the Wheaton Brook Fault, east of the Saint George Batholith.

A platinum-palladium discovery in a Precambrian mafic-ultramafic intrusive complex at Mechanic Settlement suggests potential for an economic platinum deposit. Lac Minerals Ltd. optioned the prospect from the discoverer, Robert Baxter.

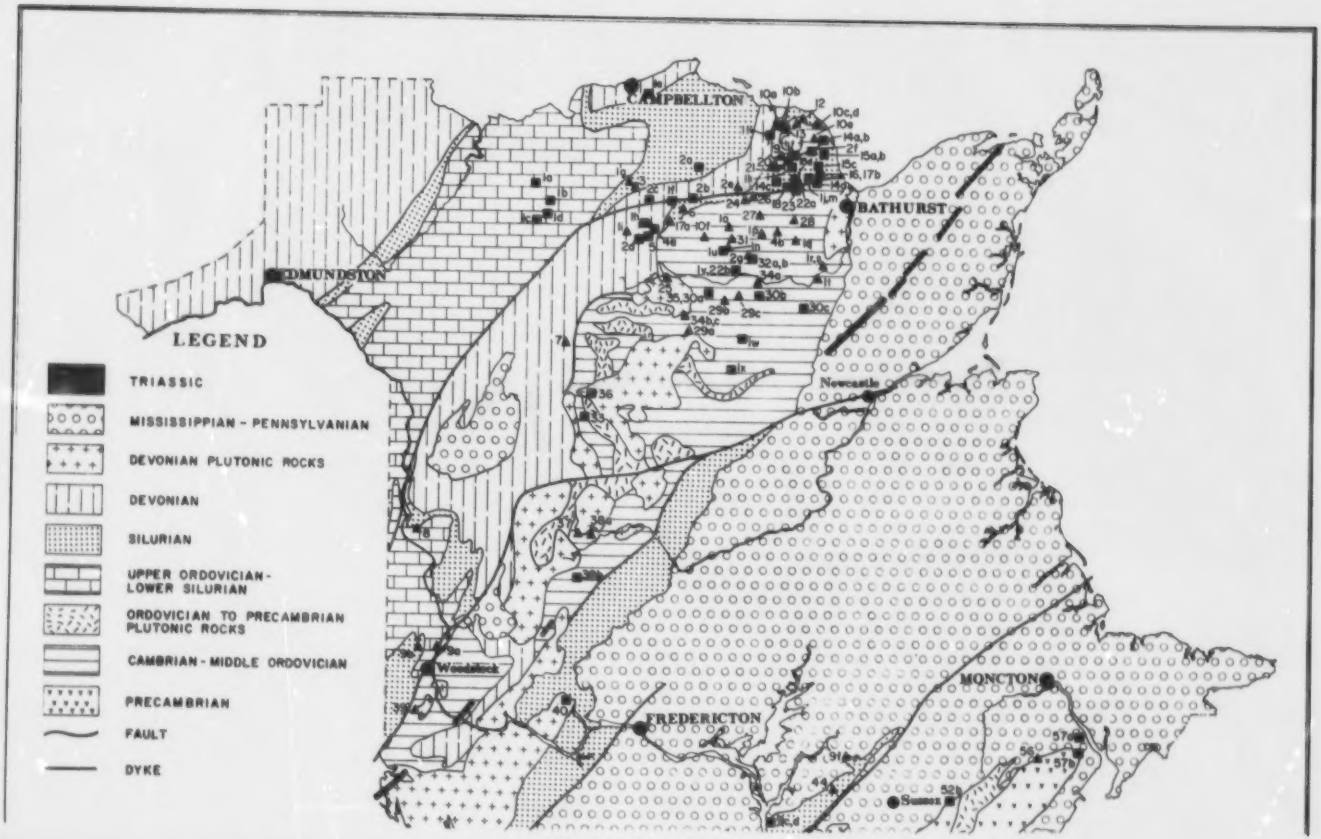

CAMPBELLTON
BATHURST
EDMUNDSTON
Newcastle
MONCTON
FREDERICTON
Woodstock
Sussex
LEGEND
TRIASSIC
MISSISSIPPIAN - PENNSYLVANIAN
DEVONIAN PLUTONIC ROCKS
DEVONIAN
SILURIAN
UPPER ORDOVICIAN - LOWER SILURIAN
ORDOVICIAN TO PRECAMBRIAN PLUTONIC ROCKS
CAMBRIAN - MIDDLE ORDOVICIAN
PRECAMBRIAN
FAULT
DYKE

Figure 15. Location of properties for which assessment reports were filed in 1987.

1 Brunswick Mining and Smelting Corporation Limited
2 Lacana Mining Corporation Limited
3 Peter Dimmell
4 Wayne Carroll
5 Peter Jamieson
6 Ken Whaley
7 Tintina Mines Limited
8 Upper Kent Lime Works Ltd.
9 Maritime Resource Research Ltd.
10 Northeast Exploration Services Ltd.
11 Mike McCombe
12 Joseph Porter
13 Heron Mines Limited
14 Acadia Mineral Ventures Limited
15 Mac Watson
16 Ben Baldwin
17 Michael Smith
18 North American Rare Metals
19 Four Seasons Resources Limited
20 Dejour Mines Limited
21 Gerald A. Allcott
22 Norman Pitre
23 Millstream Mines Limited
24 Anaconda Canada Limited
25 Cities Service Minerals Corporation
26 Sharpe Energy and Resources Limited
27 Timothy Stewart
28 Esso Resources Canada Limited
29 Merton Stewart
30 Noranda Exploration Company Limited
31 Claude Willett
32 Northumberland Mines Limited and M.D. Kierans
33 Gordel Investments Limited
34 Granges Exploration Limited
35 Mattagami Lake Exploration Limited
36 Central Electricity Generating Board Exploration (Canada) Limited
37 J.D. Irving Limited
38 C.I.P. Inc.
39 Frank C. Tompkins
40 Shediac Bay Resources Inc.
41 William Walton
42 William E. Carter
43 Pacific Coast Mines Inc.
44 Lac Minerals Limited
45 Peter Penety and Roy McIntyre
46 Goldfluor Exploration Limited
47 Morton Gordon
48 Falconcrest Resources Inc.
49 Newbrun Resources Limited
50 Brunex Gold Resources Limited
51 Great Horn Mining Inc.
52 Robert G. Baxter
53 Glenvet Resources Limited
54 Harold C. McNamara
55 Gordex Minerals Limited
56 J.A. Roy McIntyre
57 Barbara Durling

Interest also was revived in the gold-bearing rocks associated with the Honeydale thrust zone in southwestern New Brunswick. Goldfluor Exploration Limited discovered new occurrences of economic interest in the area. The results of a till geochemistry survey conducted by the Geological Surveys Branch of the Department of Natural Resources and Energy also suggest that this area has considerable unexplored gold potential.

EDITOR'S NOTE: The first name (company or individual) given for each assessment report is that of the holder of the mining rights. Since the author of the report may not be the holder of the rights, please consult the Geoscan index for cross-reference information.

MATAPEDIA-AROOSTOOK ZONE

1. **Brunswick Mining and Smelting Corporation Limited**

(a) Ritchie Brook Claim Gp. (473381) 21 O/11E

CONFIDENTIAL UNTIL JULY 28, 1989. The 12-claim group is located north of Ritchie Brook, Restigouche County. The area was prospected and a Geonics EM-16 survey was completed. Eighty-five soil samples were collected and analysed for copper, lead, zinc, arsenic, gold, and silver.

(b) Poison Lake Claim Gp. (473351) 21 O/11E

CONFIDENTIAL UNTIL MARCH 24, 1989. This group of 8-claims is north of Northwest Upsalquitch River and west of Poison Lake in Restigouche County. One hundred and twenty-two soil samples were analysed for arsenic, copper, gold, lead, silver, and zinc.

(c) 30-Mile Brook Claim Gp. (473374) 21 O/11E

CONFIDENTIAL UNTIL JUNE 17, 1989. This group of 17 claims is located at the confluence of Thirtymile Brook and Northwest Upsalquitch River in Restigouche County. General prospecting was carried out, and 188 soil samples were collected and analysed for copper, lead, zinc, arsenic, silver, and gold.

(d) 27-Mile Brook Claim Gp. (473361) 21 O/11E

CONFIDENTIAL UNTIL APRIL 16, 1989. This 19-claim group is located west of Twenty-seven Mile Brook in Restigouche County. One hundred and thirty-three soil samples were collected and analysed for arsenic, copper, gold, lead, silver, and zinc.

TOBIQUE-CHALEUR ZONE

1. **Brunswick Mining and Smelting Corporation Limited**

(e) Gimlet Brook Claim Gp. (473389) 21 O/15E

CONFIDENTIAL UNTIL AUGUST 14, 1989. The Gimlet Brook group (34 claims) is about 8 km southeast of Campbellton and 5 km west of Upper Balmoral, Restigouche County. Silt, soil and seep samples were collected and analysed for copper, lead, zinc, arsenic, gold, and silver. Rock samples were collected and assayed.

(f) McCormack/Ramsay Brook Claim Gp. (473301) 21 O/9W,10E

CONFIDENTIAL UNTIL SEPTEMBER 30, 1988. This group of 679 claims is located about 65 km west of Bathurst along the upper reaches, and predominantly west, of the Southeast Upsalquitch River and its tributaries. The property is underlain by Silurian-Devonian sedimentary rocks that are intruded by numerous small mafic and felsic dykes and plugs of probable Early Devonian age.

Regional prospecting and geochemical sampling (about 400 silt, soil and rock samples as well as heavy-mineral concentrates from till and stream sediments) delineated several areas that are anomalous in gold and/or arsenic. Three of these (Dalhousie Road, Mulligan Gulch, McCormack Brook) have been further explored by magnetometer, VLF EM and IP surveys, and trenching; two have been tested by three diamond-drill holes totalling 386.8 m. The McCormack Brook area, where gold and sulphide mineralization occur over a strike length of about 2 km, appears to have the greatest economic potential. Further work is planned.

McCormack/Ramsay Brook Claim Gp. (473404) 21 O/9W,10E

CONFIDENTIAL UNTIL OCTOBER 1, 1989. (Same claim group as McCormack/Ramsay Brook group above) A grid was established on the claim group. Five trenches were excavated and grab samples were collected and analysed for gold.

(g) Levesque Gulch Claim Gp. (473386) 21 O/10E

CONFIDENTIAL UNTIL JULY 31, 1988. The Levesque Gulch group of 16 claims is northeast of Upsalquitch Forks, Restigouche County. Heavy-mineral concentrates and seep, silt, soil, and till samples were collected and analysed. A geological survey of the area was completed.

(h) Jonpol-McCormack Brook Claim Gp. (473334) 21 O/10E

CONFIDENTIAL UNTIL JANUARY 27, 1989. This 70-claim group is located approximately 1 km south of McCormack Brook, Restigouche County. Grid lines were established on the property and 1534 silt-seep-soil and till heavy-mineral samples were collected and analysed for arsenic, copper, gold, silver,

lead, and zinc. Geological mapping, VLF EM, and proton magnetometer surveys were carried out on the property. One trench was excavated.

(i) Ramsay Brook West Claim Gp. (473387) 21 O/10E

This group of 56 claims is situated about 60 km west of Bathurst. The property is underlain by clastic sedimentary rocks of the Silurian Chaleurs Group, with one diorite dyke of probable Early Devonian age. No anomalous areas were detected as a result of a geochemical survey (71 till, 18 stream silt, 18 stream heavy-mineral-concentrate samples). The property will be dropped.

2. Lacana Mining Corporation Limited

(a) Rocky Brook Claim Gp. (473403) 21 O/9W

CONFIDENTIAL UNTIL OCTOBER 2, 1989. This group of 49 claims is located on Rocky Brook in Restigouche County. Geological and geochemical surveys were carried out. Soil, silt, and heavy-mineral samples were analysed for antimony, arsenic, copper, gold, lead, silver, and zinc.

(b) Island Lake Claim Gp. (473378) 21 O/9W

CONFIDENTIAL UNTIL JULY 7, 1989. The Island Lake group of 99 claims is located south of Jacquet River, Restigouche County. Linecutting, VLF EM-16, and proton magnetometer surveys were completed.

(c) Upsalquitch River Claim Gp. (473371) 21 O/10E

CONFIDENTIAL UNTIL JUNE 4, 1989. This group of 28 claims is on Southeast Upsalquitch River, northwest of Oxbow Brook, Restigouche County. Linecutting, prospecting, geological mapping, trenching, and stripping were carried out. A total of 97 channel samples and 146 soil samples were collected; the channel samples were analysed for gold and silver, and the soil samples for gold, silver, arsenic, bismuth, antimony, copper, and lead. Drilling (4 holes with a total depth of 496 m), VLF EM-16, and proton magnetometer surveys were completed.

(d) Budworm City Claim Gp. (473372) 21 O/10E

CONFIDENTIAL UNTIL JUNE 4, 1989. The Budworm City group (26 claims) is northwest of Third Portage Lake in Restigouche County. Linecutting, reconnaissance mapping, prospecting, proton magnetometer, and VLF EM-16 surveys were carried out. Three diamond-drill holes totalling 519 m were completed. Logs are included in this report.

(e) Acad'or Claim Gp. (473328) 21 O/9W

CONFIDENTIAL UNTIL NOVEMBER 3, 1988. This project area encompasses 14 claim groups that together contain 919 mineral claims. These claims lie in an east-northeasterly trending belt extending from the headwaters of the Tetagouche River in the west, to Nigadoo River in the east, respectively about 60 km west and 12 km northwest of Bathurst. The area is

predominantly underlain by Silurian-Devonian sedimentary rocks (Chaleurs and Dalhousie groups) that are cut by Devonian dykes, sills and plugs of mafic to intermediate composition.

Approximately 700 silt- and stream-sediment samples were collected as part of a reconnaissance geochemical survey. The stream sediments were analysed for gold, arsenic, silver, copper, lead, and zinc; the silt samples for gold, arsenic, and silver. Rock samples were collected and assayed. These surveys have delineated a number of iron-carbonate-altered areas that are anomalous in gold and/or arsenic. Many of these have coincident airborne geophysical anomalies (magnetometer and VLF EM). Follow-up work is planned.

3. Peter Dimmell

Caribou Brook Claim Gp. (473448) 21 O/10E

This group of 4 claims is approximately 70 km west of Bathurst and 4 km east of Upsalquitch Forks. The property is mainly underlain by volcanic and sedimentary rocks of the Chaleurs and Dalhousie groups, but there are also a number of small mafic dykes that intrude these rocks.

Soil sampling has delineated four zones that are anomalous in base metals with values up to 880 ppm Pb, 1150 ppm Zn and 4 ppm Ag. Rock grab samples have yielded up to 169 ppm Pb, 203 ppm Zn and 881 ppm As, but no significant precious metal values have been found.

4. Wayne Carroll

(a) Ramsay Brook Claim Gp. (473341) 21 O/10E

CONFIDENTIAL UNTIL FEBRUARY 20, 1989. This group of 6 claims is 2 km west of Southeast Depot and south of Ramsay Brook, Restigouche County. One trench was excavated on the claim group and 262 soil samples were collected and analysed for gold.

5. Peter Jamieson

Road to Resources Claim Gp. (473443) 21 O/10E

CONFIDENTIAL UNTIL DECEMBER 16, 1989. The 6 claims, located 1 km north of Third Portage Lake in Restigouche County, were prospected and a Beepmat survey was completed. Sixty-one soil samples were analysed for copper, lead, zinc, arsenic, silver, and gold.

6. Ken Whaley

Murray Brook Claim Gp. (473335) 21 O/9W

This group of 15 claims is located 60 km west of Bathurst and 40 km northeast of Mount Carleton. The property is mainly underlain by clastic sedimentary rocks of the Silurian Chaleurs Groups, but there are also several small diorite dykes.

Stream, soil and rock geochemistry yielded values up to 4000, 110, and 450 ppb Au, respectively. Further work is planned.

7. Tintina Mines Limited

Campbell River Claim Gp. (473364) 21 O/2W

This group of 120 claims is approximately 110 km southwest of Bathurst and 40 km northeast of Plaster Rock along Right Hand Branch Tobique River. The property is underlain by volcanic and sedimentary rocks of the Devonian Tobique Group.

Seven holes, totalling 610.51 m, were drilled to test coincident VLF and soil-geochemical anomalies. All core was split and assayed for gold but only selected samples were assayed for copper, lead, and zinc. The best assay reported was "0.01 oz./ton over 5 feet" (0.34 g/t over 1.5 m). No further work is planned.

8. Upper Kent Lime Works Ltd.

M.L. 1326 (473419) 21 J/12E

This mining licence is located about 4.5 km north-northeast of the Beechwood hydro-electric dam on the Saint John River. The company produces agricultural lime, and operates only during the summer months.

17. Michael Smith

(a) Simpsons Field Claim Gp. (473302) 21 O/10E

CONFIDENTIAL UNTIL SEPTEMBER 21, 1988. This group of 54 claims is about 65 km west of Bathurst along the upper reaches, and predominantly east, of the Southeast Upsalquitch River. The property, which has been optioned by Brunswick Mining and Smelting Corporation Limited, is immediately south-east of Brunswick's McCormack/Ramsay Brook claim group and has a similar geologic setting, i.e., Silurian-Devonian sedimentary rocks that are cut by small intrusions.

ELMTREE ZONE

1. Brunswick Mining and Smelting Corporation Limited

(j) Millstream Claim Gp. (473367) 21 P/12W

CONFIDENTIAL UNTIL APRIL 28, 1989. These 43 claims are approximately 2 km southeast of Nicholas Dénys, Gloucester County. A flagged grid was established on the property. One thousand five hundred and twenty-six soil samples were collected and analysed for copper, lead, zinc, silver, gold, arsenic, and antimony. Proton magnetometer and VLF EM surveys were also conducted. Trenches were excavated and grab samples were assayed for copper, lead, zinc, silver, and gold.

(k) Nigadoo Extension Claim Gp. (473370) 21 P/12W

CONFIDENTIAL UNTIL MAY 22, 1989. This group of 63 claims is located 4 km southeast of Nicholas Dénys, Gloucester County. A flagged grid was established on the property and a VLF EM survey was carried out. One thousand and thirty-one soil samples were collected and analysed for copper, lead, zinc, silver, arsenic, antimony, and gold.

(l) Nigadoo North Extension Claim Gp. (473401) 21 P/13W

CONFIDENTIAL UNTIL SEPTEMBER 25, 1989. The Nigadoo North Extension group of 12 claims is located on Ellis Brook, about 4 km northwest of Dauversière, Gloucester County. Heavy-mineral concentrates from 35 till samples were analysed for gold.

(m) Stephens Brook Claim Gp. (473333) 21 P/12W

CONFIDENTIAL UNTIL JANUARY 20, 1989. This group of 53 claims is approximately 2 km east of Nicholas Dénys, Gloucester County. Three diamond-drill holes totalling 374 m were drilled. Logs are included in the report. One hundred and eighty-three core samples were analysed for copper, lead, zinc, silver and gold.

2. Lacana Mining Corporation Limited

(f) Elmtree Brook Claim Gp. (473358) 21 P/13W

CONFIDENTIAL UNTIL MARCH 23, 1989. The Elmtree Brook group (97 claims) is located on South Branch Elmtree River, Gloucester County. A grid was established on the claims and 50 diamond-drill holes having a total depth of 6323 m were completed. Logs are included in the report.

10. Northeast Exploration Services Ltd.

(a) Mitchell Claim Gp. (473451) 21 P/13W

CONFIDENTIAL UNTIL JANUARY 7, 1990. The Mitchell group of 36 claims is about 1 km southeast of Mitchell Settlement, Restigouche County. A grid was established and geological mapping was carried out. Six diamond-drill holes totalling 456 m were completed. Logs are included in the report. Soil sampling (multi-element analysis), proton magnetometer, VLF EM-16, and Max-Min II surveys were carried out.

(b) Mitchell Claim Gp. (473336) 21 P/13W

CONFIDENTIAL UNTIL JANUARY 30,1989. This group of 6 claims is about 2 km southeast of Mitchell Settlement in Restigouche County. EM-16 and proton magnetometer surveys were completed.

(c&d) Belledune Claim Gp. (2 groups) 21 P/13W
(473338, 473354)

These groups (10 and 5 claims, respectively) are located approximately 2.5 km south of Belledune, and are underlain by rocks of the Ordovician Fournier and Elmtree groups. Soil samples, which were taken in the vicinity of VLF anomalies, yielded up to 76 ppm Cu, 156 ppm Pb, 702 ppm Zn and 3.4 ppm Ag.

Subsequent overburden drilling and geochemical analyses resulted in the dropping of all but three claims in the 10-claim group (473338).

(e) Elmtree Claim Group (473339) 21 P/13W

This group of 7 claims is approximately 3 km west of Madran near the Department of Natural Resources and Energy core storage facility for northern New Brunswick. The claims are underlain by sedimentary rocks of the Ordovician Elmtree Group. Thirty-one soil samples were collected by Pyonjar overburden drilling in an area where Noranda Exploration Company Limited had a favourable drill intersection (7.72% Cu, 0.49% Pb, 11.37% Zn and 466.97 g/t oz./t Ag over 0.6 m in 1981. Most samples yielded anomalous base metal values; one was highly anomalous (30 000 ppm Cu, 220 000 ppm Pb, 230 000 ppm Zn and 4300 ppm Ag).

11. Mike McCombe

McMillan Settlement Claim Gp. (473369) 21 O/16E

CONFIDENTIAL UNITL MAY 29, 1989. This group of 20 claims is approximately 54 km northwest of Bathurst along the east side of Jacquet River. The property is underlain by volcanic rocks of the Dalhousie Group.

One hundred and sixty-five samples were taken along three lines, and analysed for gold, silver, and barium.

12. Joseph Porter

M.L. 1320 (473399, 473411) 21 P/13W

This mining licence is located about 4 km southwest of Brunswick Mining and Smelting's lead smelter at Belledune, and is bisected by Highway 11. The property is underlain by the Ordovician Fournier Group rocks.

Magnetometer and VLF surveys were conducted over the eastern part of this mining licence. Detailed soil sampling around previously detected base-metal anomalies failed to outline any obvious trends.

13. Heron Mines Limited

Belledune Property, M.L. 1328 (473417) 21 P/13W

This mining licence is located about 4 km southwest of Brunswick Mining and Smelting's lead smelter at Belledune, and is bisected by Highway 11. The property is underlain by the Ordovician Fournier Group.

Magnetometer and VLF surveys were conducted over all of Mining Licence 1328. Existing magnetic and VLF data were filtered. Soil sampling shows a northerly trending base-metal anomaly in the eastern part of the property.

14. Acadia Mineral Ventures Limited

(a) Madran Claim Gp. (473408) 21 P/13W

CONFIDENTIAL UNTIL OCTOBER 14, 1989. This 35-claim group is 3 km west of Limestone Point, Gloucester County. A flagged grid was established on the property and 249 soil samples were collected and analysed for gold and arsenic. Samples from selected areas were analysed for lead and zinc. The claims were prospected and 23 rock samples were collected and assayed.

(b) Keymet Claim Gp. (473430) 21 P/13W

CONFIDENTIAL UNTIL NOVEMBER 18, 1989. This group of 24 claims is located 2 km west of Madran, Gloucester County. Linecutting, prospecting, and geochemical surveys were carried out. A total of 27 rock samples were assayed for copper, lead, zinc, and silver, and 175 soil samples were analysed for gold, arsenic, and silver, with follow-up analysis of selected samples for lead, zinc, and antimony.

(c) Millstream Claim Gp. (473440) 21 P/12W, 21 O/9E

CONFIDENTIAL UNTIL DECEMBER 6, 1989. The Millstream group (154 claims) is approximately 3 km west of Massabielle, Gloucester County. Linecutting and prospecting surveys were carried out. Eighty-five rock samples were collected and assayed. Eight holes totalling 172 m were drilled into overburden; samples were collected and analysed for gold and silver. A total of 103 silt and 1455 soil samples were collected. The silts were analysed for gold and arsenic, and the soils were analysed for gold, arsenic, antimony, and silver. Induced polarization, magnetometer, and VLF EM-16 surveys were completed.

15. Mac Watson

(a) Alcida Claim Gp. (473425) 21 P/13W

CONFIDENTIAL UNTIL NOVEMBER 13, 1989. The 25 claims of the Alcida group are approximately 1 km south and east of Alcida, Gloucester County. Linecutting, prospecting, and geochemical surveys were conducted on this claim group. Two rock samples were assayed for gold and 134 soil samples were collected and analysed for gold, arsenic, and silver.

(b) S. LaPlante Claim Gp. (473427) 21 P/13W

CONFIDENTIAL UNTIL NOVEMBER 13, 1989. This group of 40 claims is south of LaPlante, Gloucester County. Linecutting, prospecting, and geochemical surveys were conducted. A total of 336 soil samples were collected and analysed for gold and arsenic, followed by analysis of selected samples for lead, zinc, and silver.

(c) Free Grant Claim Gp. (473426) 21 P/12W

CONFIDENTIAL UNTIL NOVEMBER 13, 1989. The Free Grant group (59 claims) is 3 km southeast of Dauversière, Gloucester County. Linecutting and prospecting were carried out on the property. Twenty-two rock samples were assayed for gold, silver, lead, and zinc. In a geochemical survey, 17 silt and 412 soil samples were collected and analysed for gold, arsenic and silver. As a follow-up, selected soil samples were analysed for antimony.

(d) Nicholas Dénys Claim Gp. (473424) 21 P/12W

CONFIDENTIAL UNTIL NOVEMBER 13, 1989. These 13 claims are about 3 km west of Nicholas Dénys, Gloucester County. Linecutting, prospecting, and geochemical surveys were carried out on this claim group. Nineteen rock samples were collected and assayed for gold. A total of 7 silt and 491 soil samples were analysed for gold and arsenic. Additional samples were analysed for lead, zinc, and silver as well as gold and arsenic.

16. Ben Baldwin

Millstream River Claim Gp. (473412) 21 P/12W

CONFIDENTIAL UNTIL OCTOBER 21, 1989. The 12 Millstream River claims are located at Ste Rosette, Gloucester County. Rock samples were assayed for gold and silver. An EM-16 survey and drilling of two holes (totalling 205 m) were carried out. The drill logs are included in the report.

17. Michael Smith

(b) Smith Claim Gp. (473413) 21 P/12W

CONFIDENTIAL UNTIL OCTOBER 21, 1989. The Smith claim group (20 claims) is at Ste Rosette, Gloucester County. (See Ben Baldwin, above, for description).

18. North American Rare Metals

Nicholas Dénys Property, M.L. 1203, 1209 (473418) 21 P/12W

CONFIDENTIAL UNTIL OCTOBER 23, 1989. This property is on the Millstream River about 5 km southwest of Nicholas Dénys, Gloucester County. Linecutting, proton magnetometer, and VLF EM-16 surveys were completed on this property.

19. Four Seasons Resources Limited

Antinouri Lake Claim Gp. (473331) 21 P/13W

This group of 24 claims is about 30 km northwest of Bathurst, and 1.5 km south of Antinouri Lake. Much of the property is underlain by rocks of the Ordovician Elmtree Group, but the northeastern part appears to be underlain by the Devonian Antinouri Lake Granite.

A geochemical survey consisting of more than 1000 soil samples yielded values up to 605 ppm As and up to 24 ppm Sb. Some of the anomalous areas have coincident VLF conductors. Further work is planned.

20. Dejour Mines Limited

Melanson Brook Claim Gp. (473392) — 21 O/9E,16E, 21 P/12W,13W

This group of 56 claims is approximately 25 km northwest of Bathurst. The southern part of the property is underlain by sedimentary rocks of the Silurian Chaleurs Group, and the northern part by gabbro and sedimentary rocks of the Ordovician Elmtree Group.

An area of anomalous arsenic (up to 696 ppm) and gold (up to 120 ppb) in soil, associated with a linear magnetic high, has been delineated in the southern part of the property. More work is planned.

21. Gerald Allcott

Melanson Brook Claim Gp. (473388) — 21 P/12W

This group of 5 claims is situated 21 km northwest of Bathurst. The northern part of the property is underlain by the Ordovician Elmtree Group, the southern part by the Silurian Chaleurs Group. VLF, magnetometer and reconnaissance soil geochemical surveys have outlined base-metal target areas for trenching.

22. Norman Pitre

(a) Nicholas Dénys Claim Gp. (473365) — 21 P/12W

This group of 6 claims is located about 40 km northwest of Bathurst and 2 km west of Nicholas Dénys. The property is underlain by rocks of the Silurian Chaleurs Group.

A magnetometer survey was completed and a geochemical survey is planned.

MIRAMICHI ZONE

1. Brunswick Mining and Smelting Corporation Limited

(n) Indian Lake Property, M.L. 1374 (473437) — 21 O/8E

This mining licence is 25 km west of Brunswick No. 12 and 5.5 km northwest of California Lake, on the upper reaches of South Branch Forty Mile Brook. The property is underlain by felsic and mafic volcanics of the Tetagouche Group.

Two holes, totalling 486.1 m, were drilled to test Max-Min II anomalies found previously. One hole intersected 0.15 m of massive sulphides and the other, graphitic sedimentary rocks. In addition, both holes intersected felsic volcanics with disseminated sphalerite, galena and pyrite.

Previously collected soil samples were re-analysed for arsenic because of its association with precious metal mineralization at California Lake. Several northeasterly trending anomalies (2 to 3 times the mean) were located but no further work is planned.

(o) Woodside Brook Claim Gp. (473423) 21 O/9E

This group of 84 claims is approximately 7 km southeast of the Caribou mine, near Forty Mile Brook, which is about 60 km west of Bathurst. The property was staked because soil samples in the area yielded up to 75 ppb Au. Further work is in progress.

(p) Caribou Road Claim Gp. (473414) 21 O/8W,9E

This group of 147 claims is located approximately 30 km west-southwest of Bathurst. The property is underlain by a narrow band of sedimentary rocks that separates mafic volcanics to the east from felsic volcanics to the west, all part of the Tetagouche Group. A grid has been established and further work is in progress.

(q) Arseneau Road Claim Gp. (473349) 21 P/5W,12W

This group of 40 claims is located 22 km southwest of Bathurst and immediately northwest of the Brunswick No. 12 Crown Grant. The property is underlain by mafic volcanic and minor sedimentary rocks of the Tetagouche Group. Magnetometer, Max-Min, gravity, and soil geochemical surveys outlined one anomaly that may be drilled to test its base-metal content.

(r) Maritimes Mining Property, M.L. 1244 (473332) 21 P/5W

This mining licence, formerly Noranda Exploration's "Knights Brook Claim Group", is about 24 km south-southwest of Bathurst and immediately northeast of the Brunswick No. 6 Crown Grant. A down-the-hole EM survey was made on an existing diamond-drill hole (105-2) and a conductor was located about 800 m below surface. Two additional drill holes to test it have been recommended.

(s) Combined Metals Property, M.L. 1254 (473360) 21 P/5W

This mining licence is 24 km southwest of Bathurst and immediately east of the Brunswick No. 6 Crown Grant. The property is along strike from the abandoned, No. 6 open-pit.

Two holes were drilled to test the continuation of the No. 6 iron formation. One intersected a mafic dyke (locally magnetic) and the other intersected iron formation containing only minor sulphides.

(t) Gilmour Brook Property, M.L. 1343 (473444) 21 P/5W

This mining licence is about 25 km south-southwest of Bathurst, and immediately south of the Brunswick No. 6 Crown Grant. The property is underlain by Tetagouche Group rocks, some of which are similar to those at the No. 6 deposit.

Four holes, totalling 739 m, were drilled to test coincident EM and gravity anomalies. One hole (217-1) intersected disseminated sulphides in chloritic sedimentary rocks like those at the No. 6 deposit; the other three holes were barren. More work is planned.

(u) O'Hearn Brook West Claim Gp. (473435) 21 O/8E

CONFIDENTIAL UNTIL NOVEMBER 25, 1989. The O'Hearn Brook West group of 9 claims is approximately 4 km north of Strachens Lake, Northumberland County. Grid lines were established and the claims were prospected. A total of 357 soil samples were collected and analysed for copper, lead, zinc, arsenic, silver, and gold.

(v) White Birch Claim Gp. (473450) 21 O/8E

CONFIDENTIAL UNTIL DECEMBER 23, 1989. This 6-claim group is approximately 3 km southwest of California Lake, Northumberland County. Linecutting, prospecting, and geological mapping surveys were carried out. Four rock samples were collected and assayed for gold, silver, and arsenic. A total of 870 soil samples were collected and analysed for copper, lead, zinc, arsenic, silver, gold, and antimony. Geophysical surveys included proton magnetometer, VLF EM-16, and Max-Min II.

(w) Miramichi Claim Gp. (473393) 21 O/1E

CONFIDENTIAL UNTIL AUGUST 24, 1989. The Miramichi group (38 claims) is located on Little North Sevogle River, Northumberland County. Six trenches were dug and grab samples from the trenches were assayed.

(x) Chester Claim Gp. (473428) 21 O/1E

CONFIDENTIAL UNTIL NOVEMBER 16, 1989. These claims are on the east side of Clearwater Stream, Northumberland County. A linecutting survey was carried out and 11 diamond-drill holes, totalling 453 m, were drilled. The core was logged and 204 core samples were analysed for lead, zinc, copper, silver and gold. A tonnage assessment of the gossan was completed.

2. Lacana Mining Corporation Limited

(g) California Lake Claim Gp (473315) 21 O/8E

CONFIDENTIAL UNTIL NOVEMBER 14, 1988. This group of 113 claims is approximately 40 km southwest of Bathurst (west of Fortymile Brook, and north of California Lake). The property is underlain by felsic volcanic and sedimentary rocks of the Ordovician Tetagouche Group.

Soil sampling (about 2000 samples) has delineated a number of silver, arsenic and antimony anomalies in an area where quartz-breccia boulders and outcrop had previously yielded up to "52 opt Ag". Chip sampling in the discovery trench yielded up to "30.3 oz./ton Ag across 10 feet" (1038.9 g/t Ag across 3 m). Further work is planned.

4. Wayne Carroll

(b) Den Claim Gp. (473447) 21 P/12W

This group of 4 claims is about 27 km southwest of Bathurst. The property is underlain by sedimentary and basaltic rocks of the Tetagouche Group.

An EM survey (Beepmap) and preliminary prospecting failed to detect any gold mineralization.

9. Maritime Resource Research Limited

(a) Britton Mine Claim Gp. (473356) 21 J/4E

This group of 4 claims is along the Trans-Canada Highway about 1 km south of Lower Wakefield in Carleton County. Rock samples were collected and assayed for copper, lead, zinc, silver, gold, cobalt, and manganese. Mapping of the claims was completed.

(b) Woodstock Manganese Claim Gp. (473394) 21 J/4E

This group of 57 claims is along Highway 95 about 6 km west from Woodstock in western New Brunswick. The area is underlain by Middle Ordovician to Upper Silurian sedimentary rocks that are intruded by Devonian granite and gabbro. Manganiferous slates in the area have been investigated since the 1950s. A proton magnetometer survey was carried out on the property to delineate the manganese- and magnetite-rich beds. A drilling and trenching program was recommended to follow up the magnetic survey.

10. Northeast Exploration Services Limited

(f) South Branch 40-Mile Brook Claim Gp. (473396) 21 O/9W

This group of 36 claims is situated 48 km west of Bathurst and 4.5 km south of the Caribou mine. It is underlain by felsic volcanic rocks of the Ordovician Tetagouche Group.

Four trenches were dug to test coincident soil-geochemical and geophysical (VLF magnetic) anomalies. These anomalies appear to be associated with chloritized, weakly pyritic shear zones and quartz veins. Seventy-two chip samples, each across a 3 m width, yielded low base-metal and silver values.

14. Acadia Mineral Ventures Limited

(d) Robertville Claim Gp. (473434) 21 P/12W

CONFIDENTIAL UNTIL NOVEMBER 25, 1989. The Robertville claim group (30 claims) is approximately 2 km west of Ste Rosette, Gloucester County. Grid lines were established and the claims were prospected. Thirty-four rock samples were assayed for gold and selected samples were assayed for silver and antimony. A total of 532 soil samples were analysed for gold, arsenic, silver, zinc, lead, and copper.

22. Norman Pitre

(b) West Wedge Claim Gp. (473438) 21 O/8E

CONFIDENTIAL UNTIL DECEMBER 11, 1989. The West Wedge group of 43 claims is approximately 4 km southwest of California Lake, Northumberland County. Linecutting, prospecting, and geological mapping were carried out. A total of 870 soil samples were collected and analysed for copper, lead, zinc, arsenic, silver, gold, and antimony. Proton magnetometer, VLF EM-16, and Max-Min II surveys were completed.

23. Millstream Mines Limited

Acad'or Project, M.L. 1212 (473376) 21 P/12W

CONFIDENTIAL UNTIL JUNE 19, 1989. This property is located approximately 2 km southwest of Nicholas Denys, Gloucester County. A grid was surveyed. The drilling of four holes to a total depth of 540 m was completed. Logs and assays are included in the report.

24. Anaconda Canada Limited

Orvan Brook Property M.L. 1213 (473384) 21 O/9E

This mining licence is about 32 km west of Bathurst. The property is underlain by Tetagouche Group rocks.

Sixty-one soil samples were collected from the area of known base-metal mineralization and analysed for gold and arsenic. The highest values obtained were 20 ppb and 100 ppm, respectively.

25. Cities Service Minerals Corporation

Popple South Claim Gp. (473345) 21 O/7E

This 54-claim group is located at Popple Depot, Northumberland County. Magnetic and EM geophysical and soil geochemical (copper, nickel) surveys were carried out. Drilling of two holes totalled 222.4 m. The logs are included in the report.

26. Sharpe Energy and Resources Limited

Lower Tetagouche Lake Claim Gp. (473337) 21 O/9E

This group of 30 claims is located approximately 30 km west of Bathurst near Lower Tetagouche Lake. The northeastern part of the property is underlain by the Silurian Chaleurs Group, but the southwestern part is underlain by the Ordovician Tetagouche Group. VLF, magnetometer and soil geochemical surveys did not outline any precious-metal targets, but two significant base-metal anomalies were found in the southwestern part of the property.

27. Timothy Stewart

Middle River Claim Gp. (473416) 21 O/9E

This group of 36 claims is located about 20 km west of Bathurst. It is underlain by highly deformed, sedimentary and felsic volcanic rocks of the Ordovician Tetagouche Group, which are cut by small, posttectonic, intrusions of both mafic and felsic composition. Soil geochemistry outlined an area with anomalous arsenic (up to 128 ppm) and gold (up to 260 ppb) but subsequent trenching failed to find the bedrock source of the gold-bearing (10.3-10.7 g/t Au) quartz-breccia float that originally sparked interest in the property.

28. Esso Resources Canada Limited

Middle River Claim Gp. (473342, 473406) 21 P/12W

This group of 72 claims is about 20 km west-southwest of Bathurst. It is underlain by highly deformed sedimentary rocks of the Ordovician Tetagouche Group. Prospecting resulted in the discovery of several boulders that yielded assays ranging from 0.03 to 27.98 g/t Au.

After completing reconnaissance soil geochemistry and VLF surveys, an additional 13 claims were added, bringing the claim block to 85 claims. Three small grids were established, VLF EM, Max-Min and magnetometer surveys were conducted to better define anomalies detected in the reconnaissance program. Six holes, totalling 569.61 m, were drilled - the first four on grid one, and one each on grids two and three. The third hole had the best intersection, about 1 g/t Au over 1.4 m.

29. Merton Stewart

(a) Slacks Lake Claim Gp. (473436) 21 O/1W

This group of 219 claims is 25 km west-southwest of the Heath Steele mine and immediately north of Big Bald Mountain. It is predominantly underlain by rocks of the Ordovician Tetagouche Group with minor undeformed biotite-granite in the northern and southern parts of the property.

Mafic volcanic rocks are most abundant but there is a felsic volcanic band that strikes east-southeast across the claim group. Stibnite-mineralized boulders are spatially associated with this band.

The stibnite mineralization is confined to the cryptocrystalline silicified matrix of a posttectonic breccia that contains abundant felsic volcanic fragments. Eighteen of the seventy-nine rock samples from various rock types gave values ranging from 1.0-2.8% Sb. Twenty-seven chip samples, sampled along 0.5-1.4 m long channels, were collected from the original showing. A weighted average is 0.13% Sb over a strike length of 30 m and a true width of 1.0 m.

An EM-16 survey delineated a moderate to strong conductor 6.8 km long. Over much of its length, this conductor is coincident with mineralized boulders and/or mineralized outcrop, and it may be coincident with the Tomogonops fault.

(b) Otter Lake #2 Claim Gp. (473432) 21 O/8E

This group of 9 claims is located about 15 km west-northwest of the Heath Steele mine and 1.5 km southwest of Otter Lake. The property is underlain by felsic volcanic rocks of the Tetagouche Group.

Stibnite mineralization was found by reconnaissance prospecting in 1986. It occurs in a narrow silicified breccia zone that cuts the host rocks at azimuth 060°. A grab sample assayed 140 ppb Au, 7.5 ppm Ag, 2000 ppm As and 270 ppm Sb.

Of the 46 till samples, 13 yielded weakly anomalous values (5-13 ppm) in Sb. These samples are too widely scattered to delineate a target, but they are all up-ice from the original showing. Further till geochemistry is planned but with a lower detection limit than the 5 ppm Sb of the original survey.

(c) Otter Lake #1 Claim Gp. (473433) 21 O/8E

This group of 36 claims is approximately 9 km west-northwest of the Heath Steele mine and 1.5 km east of Otter Lake. The property is underlain by felsic volcanic rocks of the Ordovician Tetagouche Group.

A small outcrop containing stibnite mineralization was found along a new logging road by Timothy Stewart in 1986. Grab samples from this outcrop assayed up to 20 000 ppm Sb. The stibnite occurs within a narrow, cross-cutting zone that trends about 120°. The zone is characterized by silicified breccia and stockwork quartz-veining with stibnite in the matrix of the breccia. Trenching and chip sampling, over widths of 0.5 to 1.4 m, indicate grades up to 0.5% Sb and 4 g/t Ag.

30. **Noranda Exploration Company Limited**

(a) Half Mile Lake-Central Claim Gp. (473442) 21 O/8W

CONFIDENTIAL UNTIL DECEMBER 16, 1989. This group of 25 claims is located between northwest Miramichi River and

Halfmile Lake, Northumberland County. Seven trenches were excavated and seven diamond-drill holes (total depth of 6608 m) were completed. Seven hundred core samples were assayed for copper, lead, zinc, gold, and silver.

(b) Stratmat Claim Gp. (473385) 21 O/8E

CONFIDENTIAL UNTIL JULY 30, 1989. This group of 56 claims is south of the Heath Steele mine lease. Surveys include linecutting, geological mapping, soil geochemistry (copper, lead, zinc, silver, gold, arsenic), geophysics (VLF EM, magnetometer, HLEM, gravity), and trenching. Seventy-nine diamond-drill holes were completed. Logs and assays are included in the report.

(c) C.N.E. Claim Gp. (473410) 21 P/5W

CONFIDENTIAL UNTIL OCTOBER 16, 1989. The C.N.E. group of 14 claims is located on Portage River, Gloucester County. A grid was established and 9 holes were drilled to a total depth of 908 m. Forty-five core samples were assayed. Logs are included in the report.

31. Claude Willett

Cluster Claim Gp. (473449) 21 O/9E

This group of 18 claims is approximately 40 km southwest of Bathurst and 7.5 km northwest of California Lake. The property is underlain by Tetagouche Group rocks.

Ninety-seven soil samples were collected, of which 17 had 20-40 ppb Au and 18 had 20-80 ppm As. A sample from drill hole DH-87-220 yielded 960 g/t Ag and 993 ppb Au.

32. Northumberland Mines Limited and M.D. Kierans

(a) California Lake Property M.L. 1159 & M.L. 1261 (473391) 21 O/8E

CONFIDENTIAL UNTIL AUGUST 16, 1989. This property is located about 40 km southwest of Bathurst in the vicinity of Forty Mile Brook. It is underlain by north-northeast trending volcanic and sedimentary rocks of the Ordovician Tetagouche Group. No new work is reported but previously reported work has been summarized.

(b) California Lake Property, M.L. 1159 and 1261 (473400) 21 O/8E

CONFIDENTIAL UNTIL SEPTEMBER 23, 1989. (See Northumberland Mines Limited and M.D. Kierans above, 473391)

33. Gordel Investments Limited

Little Indian Lake Claim Gp. (473420) 21 J/15W

CONFIDENTIAL UNTIL OCTOBER 29, 1989. This 20-claim group is approximately 4 km east of Gulquac Lake, Victoria

County. A grid line was established and the claims were prospected. Thirty-two rock samples were collected and assayed for copper, lead, zinc, and silver. A magnetometer survey was carried out.

34. Granges Exploration Limited

(a) Roger Lake North Claim Gp. (473405) 21 O/8E

This group of 57 claims is about 40 km southwest of Bathurst and 5 km north of the Heath Steele mine along the Nepisiguit River. The property is underlain by rocks of the Ordovician Tetagouche Group.

An EM survey (Max-Min) delineated several moderate to strong conductors on the property. Follow-up geochemical surveys have been recommended in these anomalous areas.

(b) Goodwin Lake-Maliseet Mtn. Claim Gp. (473415) 21 O/8W

This group of 124 claims is located about 65 km southwest of Bathurst and 16 km northwest of the Heath Steele mine. It is underlain by predominantly mafic to intermediate intrusive rocks of probable Ordovician age.

Ten holes, totalling 741.27 m, were drilled to test a number of geophysical conductors. The best intersections were in hole R-41-87 where a 2.1 m section graded 1.22% Cu, 1.59% Ni and 0.49 g/t Ag, and another 6.4 m section graded 0.91% Cu, 1.09% Ni and 0.30 g/t Ag. Further work is planned in the vicinity of this hole.

(c) Goodwin Lake Claim Gp. (473397) 21 O/8W

This group of 7 claims is approximately 65 km southwest of Bathurst and 16 km northwest of the Heath Steele mine at the west end of Goodwin Lake. The property is underlain by gabbro (of probable Ordovician age) that intrudes Tetagouche Group volcanic rocks.

A single hole (53.64 m) was drilled to test an EM anomaly. A 3.2 m intersection contains pyrrhotite, pyrite and chalcopyrite mineralization. Assay results indicate low nickel values and no further work is planned.

35. Mattagami Lake Exploration Limited

Half Mile Lake Property, M.L. 1281 (473431) 21 O/8W

CONFIDENTIAL UNTIL NOVEMBER 20, 1989. This property is located between Halfmile Lake and Moody Brook, Northumberland County. A collar survey of 16 drill holes was carried out and three holes (560.8 m) were relogged.

36. Central Electricity Generating Board Exploration (Canada) Limited

Long Lake Claim Gp. (473445) 21 O/2W

CONFIDENTIAL UNTIL JANUARY 4, 1990. The Long Lake group of 60 claims covers the south half of Long Lake, Victoria County. Linecutting, prospecting, geological mapping, and radiometric surveys were carried out on these claims. A total of 24 stream-sediment and 336 soil samples were collected. The stream sediments were analysed for uranium, and the soils for uranium and molybdenum. Multi-element analyses were completed on 22 rock samples.

37. J.D. Irving Limited

McLean Brook Claim Gp. (473357) 21 J/10W

This group of 20 claims is approximately 19 km north of the village of Napadogan. The property is underlain by Devonian granitoid rocks.

Five trenches, to test EM-16 anomalies in an area where tungsten and molybdenum soil anomalies had been previously found, revealed closely spaced joints trending 100-130° but no significant mineralization. It has been recommended that the property be dropped.

38. C.I.P. Inc.

(a) McLean Brook Property, M.L. 1330 (473373) 21 J/10W

This mining licence lies 36 km northwest of Boiestown and 16 km north-northwest of Napadogan, near the Southwest Miramichi River. The eastern part of the property is underlain by Ordovician sedimentary rocks; the western part by Late Devonian granitic rocks.

Forty samples from various rock types were analysed for thirty-one elements. Tin values range from 1 to 1353 ppm with eleven samples greater than 100 ppm; tungsten values range from less than 2 to greater than 30 000 ppm with fourteen samples greater than 100 ppm, and molybdenum values range from less than 2 to 1320 ppm with five samples greater than 100 ppm. One sample yielded 360 ppb Au.

Thirty chip samples, taken over widths of 0.4-2.5 m, were collected from five trenches near the eastern boundary of the property. The lowest tin value reported is 115 ppm, the highest 6481 ppm. Only three tungsten values are less than 50 ppm, and the highest value is 1550 ppm. Arsenic is incredibly high with no value less than 1000 ppm and several greater than 30 000 ppm. Notably, all gold values are two to seven times greater than the 5 ppb detection limit.

(b) Napadogan Lake Property, M.L. 1306 (473422) 21 J/7W

CONFIDENTIAL UNTIL OCTOBER 15, 1989. This mining licence is about 40 km west-southwest of Boiestown in central New Brunswick. The property is underlain by Ordovician greywacke and slate intruded by Devonian granodiorite. A trenching and sampling program to test a geochemical anomaly was carried out.

39. Frank C. Tompkins

Oak Mountain Claim Gp. (473390) 21 J/4E

This group of 3 claims is located at Oak Mountain, approximately 4 km south of Speerville, Carleton County. The area was prospected.

MAGAGUADAVIC-ST. CROIX ZONE

9. Maritime Resource Research Limited

(c) Bauld Hill Claim Gp. (473379) 21 G/9E

CONFIDENTIAL UNTIL JULY 9, 1989. This 111-claim group is about 38 km north of Saint John near Wickham on the east side of the Saint John River. The area is underlain by Silurian sedimentary, and felsic and mafic volcanic rocks of the Queens Brook and Long Reach formations. These are intruded by Silurian-Devonian mafic and felsic stocks and dykes. Pyritiferous and hematite-rich quartz veins are locally abundant. A soil sampling survey was carried out.

(d) Bauld Hill West Claim Gp. (473398) 21 G/9E

CONFIDENTIAL UNTIL SEPTEMBER 18, 1989. The Bald Hill West group of 6 claims is 1.5 km east of Wickham in Queens County. Trenching and geological mapping surveys were completed on the claims.

40. Shediac Bay Resources Inc.

Zealand Station Claim Gp. (473350) 21 J/2W

CONFIDENTIAL UNTIL MARCH 15, 1989. The 32-claim group is about 40 km northwest of Fredericton near Zealand Station. The area is underlain by Silurian clastic sedimentary rocks that are intruded by granitoid rocks of the Devonian Pokiok Batholith. Beryllium occurs in pegmatites associated with a fine-grained chilled margin of the batholith.

Work on the claim group consisted of geological mapping, prospecting, sample collection and analyses, trenching and a berylometer survey.

41. William Walton

Kerr Lake Claim Gp. (473363) 21 G/7E

CONFIDENTIAL UNTIL APRIL 15, 1989. This 9-claim group is about 40 km north of St. George about 1 km south of Disappointment Lake and lies within the eastern lobe of the Devonian Saint George Batholith. This area contains abundant tin- and tungsten-bearing sheeted vein systems related to the latest and most highly evolved granitic phase of the batholith. In this area, it is a high-silica, medium-grained, equigranular granite. Trenching and sample analyses were completed.

42. William E. Carter

Three Bridges Brook Claim Gp. (473407) 21 G/7E

This group of 16 claims is west of Wirral, 25 km northwest of Saint John. It lies along the northwestern margin of the Saint George Batholith within a belt that contains several gold occurrences in Silurian sedimentary rocks near the Devonian granitoid intrusions. The claims straddle the boundary of the granite-sediment contact.

Silurian rocks constitute a sequence of intercalated siltstone, sandstone and tuffaceous rocks that are hornfelsed by the granite and are locally, intensely veined by quartz that may contain sulphides and abundant magnetite. A major northeast-trending fault, the Pendar Brook Fault, has produced shearing and dilatent structures within the sedimentary sequence.

Prospecting and grab sampling of host rocks and sulphide-bearing quartz veins were carried out. Gold and silver values range from 0.01 g/t to 0.27 g/t and 0.20 g/t to 13.71 g/t, respectively. One sample did not contain gold but yielded 2.00% Pb and 3.10% Zn.

43. Pacific Coast Mines Inc.

Nerepis Claim Gp. (4473377) 21 G/8W

The Nerepis group (22 claims) is 25 km north of Saint John along Highway 7 just south of a well known tin-base-metal prospect that contains anomalous gold values. The group was staked after a gold showing was found in a new road cut on Highway 7.

The area is underlain by mostly Precambrian and Lower Paleozoic felsic and mafic volcanic rocks, sedimentary rocks and diabase dykes. Granites of the Devonian Saint George Batholith, which contain tin- and tungsten-bearing greisens, intrude these rocks in the western part of the claim group. Numerous north-south trending faults and the northeast-trending Wheaton Brook Fault displace and deform the Precambrian and Paleozoic units. Base-metal sulphides are widespread within the area and gold occurs in highly sheared, silicified and sericitized felsic volcanic and sedimentary rocks just south of the Wheaton Brook Fault.

Work on the claim group consisted of geological mapping and rock sampling. Assay values as high as 3.79 g/t Au, 8% Pb, 3.6% Zn, 30.0 g/t Ag were obtained from grab samples. One channel sample yielded 2.33 g/t Au over 6.7 m but no base-metal minerals. Another channel sample gave 1.37 g/t Au, 0.2% Cu, 0.5% Pb and 0.2% Zn over 3 m.

44. Lac Minerals Limited

Annidale #1 and #2 Claim Gp. (473359) 21 H/13W

This 59-claim group is about 30 km northwest of Sussex. The area is underlain by sedimentary and mafic volcanic rocks of the Silurian Long Reach Formation. These rocks are intruded by the Devonian Stewarton ultramafic and mafic volcanic complex. The "old Annidale copper mine" prospect is a deformed stratiform deposit in mafic tuff. Southwest of the "old mine" and along the northwestern contact of the Stewarton Complex is an extensive altered zone characterized by abundant carbonate, fuchsite, varying amounts of pyrite, galena, sphalerite and small amounts of gold. Most recent work has been concentrated on rock and soil geochemical investigations. As a result of this work, six prominent anomalous areas have been delineated. Detailed investigations of these anomalous areas are planned.

45. Peter Fenety and Roy McIntyre

Cundy Lake Claim Gp. (473347) 21 G/7E

CONFIDENTIAL UNTIL MARCH 18, 1988. This 8-claim group is west of West Long Lake, about 30 km north of St. George, and covers one of several gold occurrences that occur along the northwest margin of the Saint George Batholith.

The group straddles the contact between the youngest granitic phase of the undeformed, Devonian Saint George Batholith and the highly deformed Silurian sedimentary rocks of the Waweig Formation. The sedimentary rocks are intensely veined by quartz and silicified in places. The area was prospected and chip samples were analysed.

46. Goldfluor Explorations Limited

Lower Tower Hill Claim Gp. (473402) 21 G/6E

CONFIDENTIAL UNTIL OCTOBER 2, 1989. This group of 6 claims is at Lower Tower Hill, 30 km northeast of the town of St. Stephen. In 1954, an 8 m wide quartz vein assaying 50.4 g/t Au, 47.3 g/t Ag and 0.29% Co was found on the property. Recent work on the prospect included general prospecting, trenching and assaying.

47. Morton Gordon

(a) St. Stephen Nickel Claim Gp. (473429) 21 G/3W

CONFIDENTIAL UNTIL NOVEMBER 16, 1989. These 35 claims are 3 km north of St. Stephen in Charlotte County. Samples were collected and analysed for nickel, copper, iron, sulphur,

platinum, and palladium. Mineralogical analyses and reserve calculations were also carried out.

(b) St. Stephen Nickel Claim Gp. (473348) 21 G/3W

CONFIDENTIAL UNTIL MARCH 15, 1989. This 15-claim group is 3 km north of St. Stephen and covers a Devonian mafic and ultramafic intrusive complex with associated nickel, copper, cobalt and minor platinum minerals. The complex intrudes highly deformed sedimentary rocks of the Cookson Formation. Bacterial leaching studies were conducted on the nickel-copper-cobalt ore.

48. Falconcrest Resources Inc.

(a) Mistake Lake Claim Gp. (473352) 21 G/7E

CONFIDENTIAL UNTIL APRIL 15, 1989. The group of 46 claims is about 40 km north of St. George at Disappointment Lake. It lies entirely within the eastern lobe of the Devonian Saint George Batholith. The group incorporates an area containing abundant tin- and tungsten-bearing sheeted vein systems that are common in this part of the batholith. In this area, the veins are associated with late-stage, high-silica, medium-grained, equigranular granites that intrude coarser grained, seriate granites.

Work done on the property included geological mapping, prospecting, magnetometer and soil sampling surveys, channel and grab sampling, and trenching.

CALEDONIA ZONE

9. Maritime Resource Research Limited

(e) Elliot Road Claim Gp. (473441) 21 H/5W

CONFIDENTIAL UNTIL DECEMBER 18, 1989. The Elliot Road group of 7 claims is in the eastern outskirts of the city of Saint John. The area is underlain by limestone of the Precambrian Green Head Group. The geology of the property was mapped in detail and samples were collected for chemical analyses.

47. Morton Gordon

(c) Black River Claim Gp. (473368) 21 H/5W

CONFIDENTIAL UNTIL MAY 21, 1989. This 15-claim group is 18 km southeast of Saint John at Black River, near the Bay of Fundy coast and along strike of the Gordex gold mine. The claims are underlain by Precambrian volcanic and sedimentary rocks of the Coldbrook Group that are intruded by Precambrian granodiorite. These rocks are in fault contact with Carboniferous or older clastic sedimentary rocks assigned to the Cape Spencer Formation, and with Carboniferous fluvial sedimentary sequences.

Gold-bearing veins have been identified in this area and are commonly associated with the major northeast-trending faults. A soil sampling survey was carried out.

(c) Black River Claim Gp. (473362) 21 H/5W

CONFIDENTIAL UNTIL APRIL 15, 1989. The geology of this 15-claim group is described above (Morton Gordon, Black River claim group, 473368). An aerial photographic interpretation of linear structures was completed.

48. Falconcrest Resources Inc.

(b) Scott Falls Claim Gp. (473366) 21 G/1W

CONFIDENTIAL UNTIL APRIL 23, 1989. The Scott Falls group (20 claims) is 22 km west of Saint John, just south of the Musquash Reservoir. The claim group is traversed by a major northeast-trending fault that juxtaposes Precambrian granitoid rocks to the north and mainly Carboniferous sedimentary rocks of the Lancaster Formation to the south. Silver and base-metal sulphides are associated with the fault zone. Geological mapping, orientation geophysical surveys, soil sampling and rock sampling surveys were completed.

49. Newbrun Resources Limited

Gooseberry Cove Claim Gp. (473395) 21 G/1W

This 6-claim group is 25 km west of Saint John near the mouth of Musquash Harbour at Gooseberry Cove. The area contains Precambrian gold- and base-metal-bearing granite intrusions.

The claim group is underlain by intensely deformed, Precambrian mafic volcanic and sedimentary rocks that are unconformably overlain by Carboniferous rocks. The latter comprise a sequence of Windsor Group limestone overlain by sandstone, mudstone and conglomerate. This package is thrust to the north over Precambrian intrusive rocks.

Work included prospecting, rock sampling and soil sampling in the northern part of the claim group to follow-up a gold anomaly delineated in 1985. Gold values in soils ranged from 0.01 g/t to 0.06 g/t. The soil sample with the highest gold value also yielded low, but anomalous base-metal values.

50. Brunex Gold Resources Limited

West Beach Property, M.L. 1275 (473439) 21 H/4W

CONFIDENTIAL UNTIL DECEMBER 9, 1989. This gold prospect is in the Beveridge Cove area, about 8 km northeast of Cape Spencer and 18 km southeast of Saint John. The oldest rocks in the area are mafic volcanic and sedimentary rocks of the Late Precambrian Coldbrook Group that are thrust over Carboniferous or older, highly deformed metasediments. The metasediments are in faulted contact with Precambrian or younger granite, which is intensely sheared, argillitized,

sericitized and silicified. Hematite is locally abundant along a prominent fault. Small amounts of gold (0.67-2.74 g/t Au) were found in hematite-rich quartz that occurs where a northeast-striking fault cuts the granite. During 1987, soil geochemical, VLF EM and magnetometer surveys were carried out over the property.

51. Great Horn Mining Inc.

(a) Ghost Lake Claim Gp. (473409) 21 G/8E

This 32-claim group is 8 km northwest of Saint John near Highway 7. It is one of the potentially economic dolomite deposits in the vicinity of Saint John.

It is underlain by the Precambrian Green Head Group, which is composed of dolomite with some associated limestone and diabase dykes. A feasibility study for the manufacture of dolomite is proposed.

Analyses of grab samples collected from the claim group were carried out and recommendations for development of the deposit were made.

(b) Lorneville Dolomite Claim Gp. (473353) 21 G/1E

CONFIDENTIAL UNTIL MARCH 25, 1989. This group of 4 claims is 10 km south of Saint John on the west shore of Lorneville Harbour and is one of the potentially economic dolomite deposits in the Saint John area.

The property is underlain by dolomite, quartzite and sandstone of the Precambrian Green Head Group that is intruded by minor diabase dykes. The results of work done to date, including geological mapping and diamond drilling, were compiled. Dolomite reserve were calculated.

52. Robert G. Baxter

(a) Golden Grove Claim Gp. (473380) 21 H/5W

This 12-claim group is located 8 km northeast of Saint John near Brookville. It is underlain by various rock types of Precambrian age including gneiss, deformed mafic volcanics and granitoid rocks, and gabbro. A northeast-trending fault cuts the sequence on the northern part of the property.

In conjunction with geological mapping and channel sampling, a soil sampling survey was conducted to delineate the extent of gold-bearing rock (10.14 g/t) that was found in a pod of iron sulfides near the centre of the grid. A VLF survey was also conducted to delineate the extension of the northeast-trending fault with possible graphite potential.

A 0.6 m channel sample of chips taken at the gold showing yielded 0.34 g/t Au. The soil sampling survey defined two additional areas of possible gold-bearing rocks and the VLF survey indicated a conductor in the vicinity of the northeast-trending fault.

(b) Mechanic Settlement Claim Gp. (473421) 21 H/11E

CONFIDENTIAL UNTIL OCTOBER 30, 1989. This platinum-palladium prospect is at Mechanic Settlement in the Caledonia Highlands, about 20 km east of the Town of Sussex. The prospect occurs in a Precambrian, layered ultramafic-mafic intrusive complex. Platinum and palladium with combined values up to 2 g/t are associated with sulphides in the peridotite phase.

The geology of the prospect has been mapped by D. Paktunc of the Geological Survey of Canada. Self-potential and magnetometer surveys were conducted on the property. Sulphides derived from boulders in brooks crossing the property were concentrated by panning.

53. Glenvet Resources Limited

(a) Golden Grove Graphite Claim Gp. (473383) 21 H/5W

CONFIDENTIAL UNTIL JUNE 1, 1989. The claim group is about 25 km northeast of the City of Saint John. The area is underlain by metasedimentary and metavolcanic rocks of the Precambrian Green Head and Coldbrook groups. The Green Head Group is composed mainly of intensely deformed limestone, dolomite, quartzite, biotite schist, and graphite schist. Gneissic syenite, granodiorite, granite and gabbro occur as fault slices in the metasedimentary and metavolcanic sequence.

The property was staked for its graphite potential. In the trenched zone, graphitic bands are intercalated with carbonate, quartzite, biotite-muscovite schist, and quartzo-feldspathic schist.

Recent work on the property included a multifrequency Max-Min electromagnetic survey, trenching, diamond drilling, chemical analyses of drill cores and metallurgical tests.

(b) Millican Lake Claim Gp. (473375) 21 H/4W

CONFIDENTIAL UNTIL JUNE 4, 1989. This 22-claim group is about 15 km southeast of Saint John, near Millican Lake and immediately north of the Gordex gold mine. Precambrian granitoid rocks in the southern part of the claim group are unconformably overlain by Carboniferous or older sedimentary rocks. Carboniferous fluvial sedimentary rocks occur in the northern part of the property. Gold-bearing quartz-carbonate veins have been reported in this area. Geological mapping, a soil and pan-concentrate survey, magnetometer, VLF and IP surveys, and diamond drilling were carried out.

54. Harold C. McNamara

Balls Lake Claim Gp. (473340) 21 H/4W

This group of 40 claims is between Balls Lake and the Gordex mine, 12 km southeast of Saint John. The claim group is mostly underlain by Carboniferous sandstone and conglomerate of the Lancaster Formation. One hole was drilled to determine the extent of an altered pyritic zone that occurs near the property.

The core was not assayed, but an altered siltstone unit similar to the auriferous zones to the south was encountered.

55. Gordex Minerals Limited

Cape Spencer Property, M.L. 1274 (473382) 21 H/4W

Gordex conducted an extensive exploration programme on the claims adjacent to the mine area, about 15 km southeast of Saint John. Gold occurs in intensely illitized and carbonatized rocks that occupy a thrust zone in which Precambrian granitic rocks are superimposed on Carboniferous or older arkosic sedimentary rocks. Soil geochemistry, trenching, geophysical surveys, diamond drilling and mineralogical investigations were carried out. The geophysical work included magnetic, VLF EM, and induced polarization surveys. The best gold-bearing intersections published from this drilling included 3.96 m of 13.7 g/t Au, 16.2 m of 5.14 g/t Au, 7 m of 6.5 g/t Au, 3.7 m of 5.14 g/t Au, 5.5 m of 10.29 g/t Au, and 2.44 m of 5.14 g/t Au.

MONCTON-CUMBERLAND BASIN

56. J.A. Roy McIntyre

Stuart Mountain Claim Gp. (473346) 21 H/15W

The Stuart Mountain claim group (33 claims) is 20 km southwest of Moncton. The area is underlain by the Carboniferous Albert Formation immediately north of the faulted contact with intensely sheared felsic volcanic rocks of the Precambrian Coldbrook Group. Small shears with pyrite and locally chalcopyrite assay in places up to 2.18 g/t Au.

57. Barbara Durling

(a) Hillsborough Claim Gp. (473343) 21 H/15E

CONFIDENTIAL UNTIL FEBRUARY 25, 1989. This group of 34 claims is west of Hillsborough, about 15 km south of Moncton, and covers one of the largest and most recently mined gypsum deposits in southern New Brunswick.

The gypsum-anhydrite deposits and the underlying limestone constitute the Carboniferous Windsor Group which is underlain by the redbeds of the Hillsborough Formation. The gypsum-anhydrite is overlain by redbeds of the Enragé Formation that is in turn overlain by grey, fluvial sequences of the Boss Point Formation. The area was mapped and samples were taken and analysed for gypsum content.

(b) Demoiselle Creek Claim Gp. (473344) 21 H/15E

CONFIDENTIAL UNTIL FEBRUARY 25, 1989. This 18-claim group is about 20 km south of Moncton near the community of Demoiselle Creek. The claims cover one of several historically significant gypsum deposits in the Windsor Group of southern New Brunswick.

The gypsum-anhydrite evaporite deposits and underlying limestone constitute the Windsor Group of this locality. The Windsor Group is underlain and overlain by redbed sequences of the Hillsborough and Enragé formations, respectively. Locally, the Windsor Group overlaps Precambrian basement. The area was mapped, and samples were taken and analysed for gypsum content.

CARBONIFEROUS PLATFORM

9. Maritime Resource Research Limited

(f) Sheba Claim Gp. (473355) 21 H/13E

This 18-claim group is 23 km northwest of Sussex at Sheba, just east of Highway 2. The area is underlain by flat-lying, Carboniferous sandstone, siltstone and conglomerate that unconformably overlie intensely deformed Late Silurian mafic and felsic volcanic and sedimentary rocks intruded by mafic dykes. Several Acadian northeast-trending faults and at least one northwest-trending fault occur in the Silurian rocks. The Late Silurian rocks in the region are host to numerous base-metal and precious-metal occurrences.

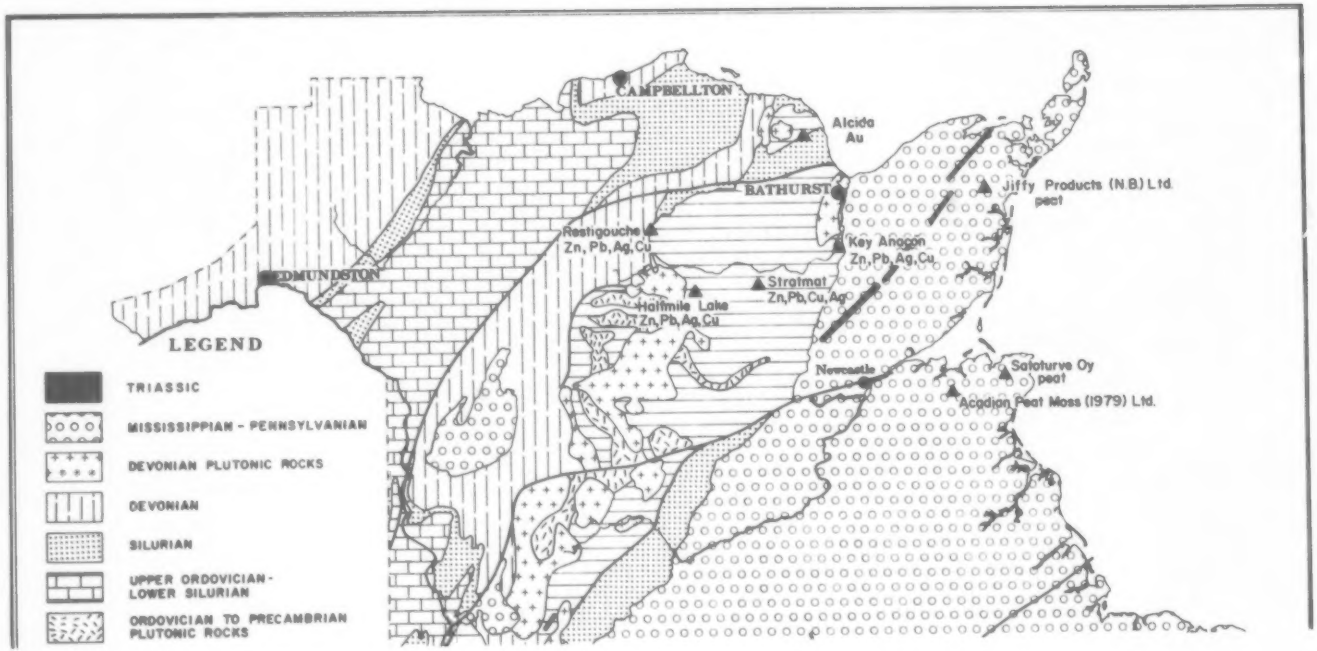
Work on the property was initiated by the discovery of a base-metal, pyrite-rich showing in the early 1960s that was subsequently followed up by promising soil sampling and VLF surveys, and drilling of EM targets. Analyses of core drilled in 1984, after detailed scanning electron microscope (S.E.M.) studies were conducted, yielded values of 15 g/t Ag over 1.5 m, 0.15 g/t Au over 1.2 m and 0.16 g/t Au over 0.9 m. Additional diamond-drilling of EM anomalies did not encounter significant precious metals but did intersect low but anomalous base-metal sulphides.

MINERAL OCCURRENCES 4,5,8

Alcida Gold Deposit 21 P/13W

LOCATION The property is located 21 km northwest of Bathurst, in the Alcida-Dauversière area (Figure 16). (Lat. 47°46.5'N; Long. 65°52'W).

COMPANY Lacana Mining Corporation (Exec. Office) 1702, 150 King St. W., P.O. Box 19, Toronto, M5H 1J9 (30%); Murphy Oil Co., 1700, 800-6th Avenue SW, Calgary T2P 3Y3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Alcida
Au
BATHURST
Jiffy Products (N.B.) Ltd.
peat
Restigouche
Zn, Pb, Ag, Cu
Key Anacon
Zn, Pb, Ag, Cu
EDMUNDSTON
Stratmat
Zn, Pb, Cu, Ag
Halfmile Lake
Zn, Pb, Ag, Cu
Newcastle
Sofoturve Oy
peat
Acadian Peat Moss (1979) Ltd.
LEGEND
TRIASSIC
MISSISSIPPIAN - PENNSYLVANIAN
DEVONIAN PLUTONIC ROCKS
DEVONIAN
SILURIAN
UPPER ORDOVICIAN-
LOWER SILURIAN
ORDOVICIAN TO PRECAMBRIAN
PLUTONIC ROCKS

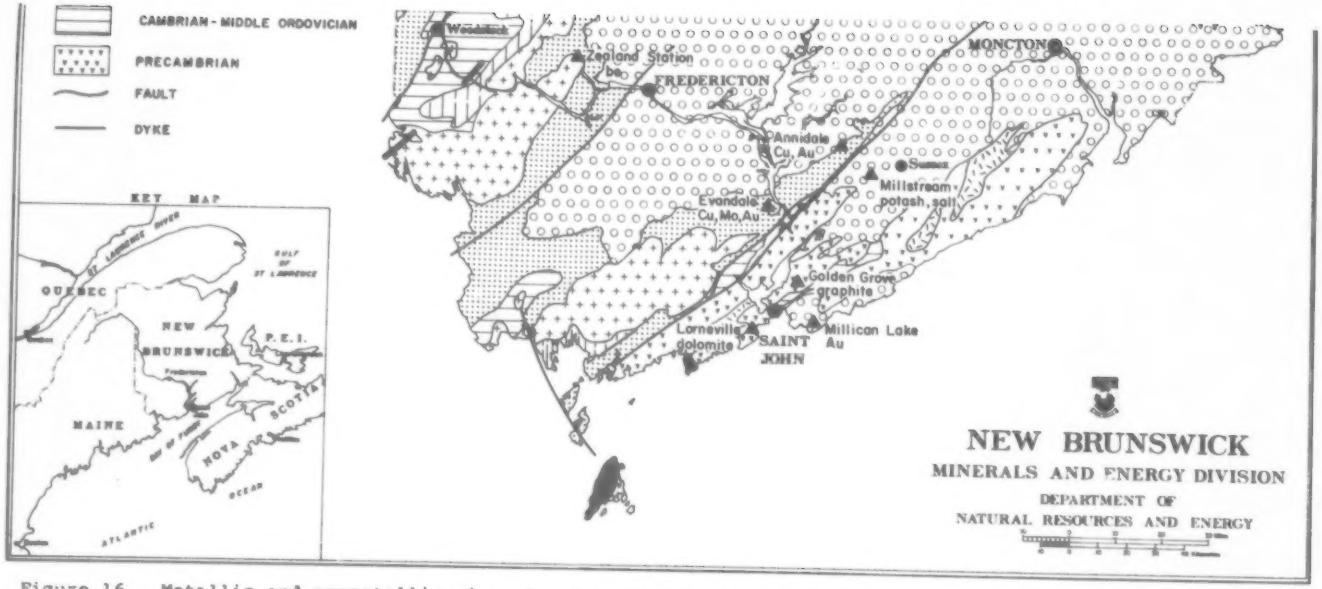


Figure 16. Metallic and nonmetallic mineral occurrences in New Brunswick.

(22.5%); Oakwood Petroleums Ltd., 1800, 311-6th Avenue SW, Calgary T2P 3H2 (22.5%); Sparton Resources Inc., 500, 67 Richmond St. W, Toronto M5H 1Z5 (18.5%); Lynx-Canada Explorations, 520, 25 Adelaide St. E., Toronto M5C 1Y2 (6.5%). Chief Geologist - A. Lee Barker.

HISTORY The initial discovery that aroused interest in this area was made by George Murphy, who was investigating an area selected by the New Brunswick Prospecting Syndicate. Electromagnetic, magnetic and soil geochemical surveys outlined anomalies over the original discovery ('discovery zone') and farther west in the 'west gabbro zone.' Trenching revealed gold- and silver-bearing mineralization in both zones. A number of holes have been drilled. Exploration costs are being paid by Lacana Mining Corporation, American Oakwood Energy Limited and Lynx-Canada Explorations Ltd. Other small interests are vested in Acadia Mineral Ventures Ltd. and Silver Sceptre Mines Limited.

GEOLOGY The 'discovery zone' comprises northwesterly trending sphalerite-pyrite-galena-stibnite-arsenopyrite veins and disseminations that cut polydeformed Ordovician (Elmtree Group) metasedimentary rocks. The mineralization occurs near a contact with less deformed Silurian (Chaleurs Group) sedimentary rocks. Chip samples from this zone assayed up to 5.1 g/t Au and 118.6 g/t Ag over 1.8 m. The mineralization in the 'west gabbro zone' comprises pyrite, marcasite, arsenopyrite and pyrrhotite as fracture fillings and disseminations in a highly altered and fractured metagabbro sill and/or dyke that intrudes the Elmtree sediments. The mineralized rocks have been traced for 260 m along strike, over a width of 18 m and to a vertical depth of 49 m. Some deeper holes indicate mineralization to a depth of 167 m. The gold content is variable, ranging from 2.1 to 5.5 g/t Au over 18 m; however, narrower sections (1-2 m) assayed 6.9-13.7 g/t Au.

RESERVES No estimate of reserves has been made.

DEVELOPMENT The 'discovery zone' has been tested by five diamond-drill holes and the 'west gabbro zone' has been tested by 60 drill holes. As the mineralization is restricted to gabbro and the gabbro body appears to be plunging to the east, additional drilling has been planned and carried out toward the east.

Annidale Copper, Gold — 21 H/13W

LOCATION The Annidale copper deposit is about 2 km south of Annidale, Kings County (Figure 16).

COMPANY Lac Minerals Limited

HISTORY Copper sulphides were first found in the Annidale area around 1900. Between 1902 and 1922, several short shafts and pits were sunk into the deposit. Around 1920, two carloads of high-grade copper ore were sold from the mine. American Metals Mining Company and New Brunswick Copper Corp. drilled part of the deposit between 1951 and 1955. Cities Services Mineral Corporation uncovered part of the deposit in

1969. In addition, this company discovered an intensely altered mafic igneous complex cut by numerous quartz-gold carbonate veins in the western part of the property. Low-grade gold, up to 2.4 g/t, was found locally in samples collected from this zone by geologists of the Geological Surveys Branch and by M.J. Grant and W.J. Walton. In 1983 and 1986, the property was optioned by Minerais Lac Ltée and some diamond drilling was carried out in the gold-bearing chromium-mica zone. Some base-metal sulphides that were intersected contained silver and low-grade gold values locally.

GEOLOGY The Annidale deposit is in a northeast-trending belt of Ordovician and/or Silurian argillaceous sedimentary rocks with intercalated mafic flows, tuffs and related intrusive rocks. A northeast-trending Devonian intrusion composed of gabbro, diorite, and quartz monzonite cuts across these rocks to the south of the deposit. It is associated with a major northeast-trending fault zone that can be traced 15 km.

The deposit dips 40°-70° northwest and was traced along strike for 240 km. It was drilled to a depth of about 60 m. The width ranges from a few centimetres to about 2.5 m. The main copper sulphides are chalcopyrite and bornite, which occupy voids and fractures in brecciated pyrite. A rather unusual alteration zone with disseminated pyrite, minor sphalerite and galena, and trace amounts of silver and gold were found just south of the Annidale deposit.

RESERVES Drill-indicated reserves (1983) are about 90 720 t grading 2-7% copper. It also contains about 4 g/t Ag for each per cent of copper. This tonnage may be increased when the limits of the deposit are determined by additional drilling.

DEVELOPMENTS Rock and soil geochemistry studies were carried out. Six prominent anomalous areas were delineated and detailed investigations of these are planned.

Evandale Copper, Molybdenum, Gold 21 G/9W

LOCATION The Evandale copper-molybdenum zone is located about 3 km west of Evandale (Figure 16).

COMPANY Costigan Gold Corporation

HISTORY The mineralized zone was discovered in 1967 as a result of a stream-sediment geochemical survey. A limited amount of soil geochemistry, geophysics, and diamond drilling was carried out by Rio Tinto Exploration.

GEOLOGY Massive pink granite of the Evandale Stock was found to be weakly mineralized with pyrite, chalcopyrite, and molybdenite. The mineralization is disseminated or present along northwesterly trending joints and quartz stringers in a broad zone about 300 m wide and 2450 m long. Mineralized float and outcrop were noted in several areas.

RESERVES Not determined.

DEVELOPMENTS The mineral rights were transferred from Bruce G. Taylor to Costigan Gold Corporation in 1987.

Halfmile Lake Zinc, Lead, Silver, Copper 21 O/8W

LOCATION The Halfmile Lake deposit is 19 km west of the Heath Steele mine, Northumberland Co. It is accessible via Highway 430 and secondary roads (Figure 16). (Lat. 47°25'N; Long. 66°19'W)

COMPANY Falconbridge Limited now controls the Kidd Creek Mines (Texasgulf) part of the sulphide deposit, whereas Brunswick Mining and Smelting Corporation Limited along with Canacord Resources Inc. has optioned the Conwest part of the deposit. Canacord Resources contributed $300 000 to a flow-through share drilling program.

HISTORY Mineralization was discovered in 1955 by Texasgulf (Middle River Mining Company) as a result of regional geological mapping followed by airborne EM and follow-up ground EM. Bay Copper Mines found the down-dip extension by drilling. Mineral dressing experiments were carried out with limited success. An option agreement was reached between the two companies in 1974. The following year, 7544 m of deep drilling confirmed the continuity of the sulphide body at depth. In 1976 the company considered construction of an 853 m exploration shaft but plans were shelved. An airborne EM survey flown in 1975 (reported in 1976) indicated no additional targets. In 1979 the Texasgulf property was optioned to Billiton, who drilled a total of 21 336 m in 1980-81. In 1983, Billiton dropped its interest in the property. In 1985, Falconbridge investigated the extent of the gossan on the deposit and its gold-silver content.

GEOLOGY The deposit consists of at least three mineralized zones occurring as northeast-trending, en echelon lenses within a 3 km long sulphide-bearing sequence. These zones, from west to east, are known as Halfmile Lake (Texasgulf), Halfmile Lake (Conwest), and Halfmile Lake North.

The Halfmile Lake (Texasgulf) zone contains pyrite-pyrrhotite-sphalerite-galena-chalcopyrite mineralization. The sulphide zone plunges 35°N. The Halfmile Lake (Conwest) zone contains pyrrhotite-sphalerite-galena-chalcopyrite mineralization. This zone plunges 35°SW(?). The Halfmile Lake North zone contains pyrrhotite-pyrite-sphalerite mineralization. This zone plunges 30°N. Zoning indicates that tops are toward the south.

RESERVES

Halfmile Lake Zone (Texasgulf, Kidd Creek)
4 717 357 t (6.57% Zn, 2.49% Pb, 0.39% Cu)
1 088 621 t (2.00% Cu)
Halfmile Lake Zone (Conwest)
2 041 164 t (7.7% Zn, 2.5% Pb, 0.14% Cu)
Halfmile Lake North Zone (Noranda)
789 250 t (4.95% Zn, 0.87% Pb, 0.39% Cu, 8.23 g/t Ag, 0.171 g/t Au)

DEVELOPMENTS In 1987, extensive drilling has been carried out on Halfmile Lake (Conwest) Zone. Brunswick Mining and Smelting Corporation Limited has been looking for additional targets within this zone.

Key Anacon Zinc, Lead, Silver, Copper 21 P/5E

LOCATION The Key Anacon deposit is located 23 km south of Bathurst in Gloucester County (Figure 16). (Lat. 47°26.1'N; Long. 65°41.8'W)

COMPANY Key Anacon Mines Limited, Saint John, N.B.

HISTORY Chalcopyrite near the Key Anacon deposit was discovered by H.Y. Hind in 1864. The main Pb-Zn deposit was found by drilling a ground EM anomaly in 1953, although the initial staking was based on an aeromagnetic anomaly. A 457 m shaft was sunk and nine levels excavated. A feasibility study was carried out from 1970-73. No significant additional tonnage has been found.

GEOLOGY The deposit consists of at least four mineralized zones occurring as northwest-trending en echelon lenses within a 3 km long sulphide-bearing sequence. These zones from southeast to northwest are: Zone 1, Zone 2, Zone 3, and Copper Zone.

Zone 1 was outlined by 20 surface diamond-drill holes on 61 m spacings. The zone has a length of 490 m, a thickness of 2 m, and extends to a depth of 180 m. The main minerals are pyrite, sphalerite, galena, and pyrrhotite. A plan with surface projections, cross sections, and a longitudinal section suggests probable reserves of 337 000 t grading 1.05% Pb, 3.86% Zn, and 42.86 g/t Ag.

Zone 2 is the only zone that has been sufficiently investigated by underground drilling. Nine levels were developed to a depth of 440 m and at a level spacing of 45 m; 229 holes were drilled from these levels. During June and July, 1986, Paul Rennick (New Brunswick Department of Natural Resources and Energy) relogged most of this core.

Zone 2 consists of at least three lenses that occur in sharp contact with mafic volcanic rocks in the hanging wall, and is closely associated with the quartzose sedimentary rocks and intercalated felsic volcanic rocks. The zone has a length of 120 m, a width of 75 m, and extends to a depth of 400 m.

Pyrite-chalcopyrite, pyrite-sphalerite-galena, and pyrrhotite-pyrite-sphalerite-galena are the dominant assemblages, but arsenopyrite and tetrahedrite occur locally. In low-grade Pb-Zn zones, pyrite is generally massive and commonly colloform, whereas zinc-lead-rich parts are banded and/or brecciated. Pyrite-chalcopyrite generally occurs in disseminations and banded sulphides.

Zone 3 was outlined by 11 surface drill holes spaced at 30 m intervals. The zone has a length of 490 m, approximate thickness of 2.5 m, and extends to a depth of 180 m. A plan with surface projections, cross sections, and a longitudinal section suggest probable geological reserves of 79 000 t grading 1.69% Pb, 7.40% Zn, and 50.40 g/t Ag.

The copper zone includes the Road Copper and Discovery zones. The Discovery Zone is exposed at the surface (Leger showing) on the western bank of the Nepisiguit River about 60 m southwest of the bridge. Some of the 15 holes drilled on this zone intersected about 2% Cu over 0.6-1.5 m core lengths.

The Road Copper Zone was outlined by nine diamond-drill holes. One of the holes intersected 10.53% Cu and 13.7 g/t Au across 0.4 m. The mineralization is mainly disseminated chalcopyrite in a zone 60 m long, 3.1 m thick, and extends to a depth of 150 m.

RESERVES (Summary of Zone 2 in situ reserves)
High-grade ore (greater than 10% Cu+Pb+Zn)
1 103 722 t, proven reserves
32 881 t, additional probable reserves
0.22% Cu, 3.47% Pb, 8.41% Zn, 111.43 g/t Ag
8.5 m, average thickness
Low-grade ore (5-10% Cu+Pb+Zn)
285 046 t, proven reserves
27 874 t, additional probable reserves
0.16% Cu, 1.50% Pb, 4.75% Zn, 35.66 g/t Ag
4.6 m, average thickness
Copper ore (less than 1% Cu)
69 770 t, proven reserves
18 129 t, additional probable reserves
1.45% Cu, 0.41% Pb, 1.08% Zn, 26.4 g/t Ag
3 m, average thickness

Gold values varying from 1.03 to 5.49 g/t Au are generally associated with the pyrite-chalcopyrite (copper) horizon of Zone 2.

DEVELOPMENTS R.R. Irrinki of the New Brunswick Department of Natural Resources and Energy, Geological Surveys Branch, has completed ore reserve estimations for this deposit.

Millican Lake Gold 21 H/4

LOCATION The Millican Lake gold property is located 15 km east of the City of Saint John. It extends from the Cape Spencer deposit northeast to Millican Lake (Figure 16). (Lat. 45°12'30"; Long. 65°54'30")

COMPANY Mispec Resources Inc. Mr. Harold McNamara is company president.

HISTORY Soil sampling and trenching (mostly in 1985 and 1986) made it possible to trace the gold-bearing zone from the Cape Spencer deposit northeastward to Millican Lake. In 1986, about 80 short holes were drilled on the property to delineate the ore zone. Drilling was guided by gold panning results (tills), trenching, and an induced polarization geophysical survey.

DEVELOPMENTS Under the Mineral Investment Stimulation Program (MISP), 42 holes were drilled in 1987 and 25 bulk surface samples were collected for analysis.

Restigouche Zinc, Lead, Silver, Copper 21 O/7, 10

LOCATION The Restigouche deposit is about 60 km west of Bathurst in Restigouche County (Figure 16). (Lat. 47°30.2'N; Long. 66°33.5'W)

COMPANY Northumberland Mines Limited

HISTORY The property was initially staked by Selco in 1954 because of strong base-metal anomalies in streams draining the area. The property was optioned to New Jersey Zinc Company in 1957 who discovered the sulphide deposit by drilling a strong soil geochemical anomaly. Teck Corporation (Keevil Mining Group) optioned the property in 1965. After several drill holes and metallurgical tests, Teck dropped its option in 1970. In 1972 the property was optioned to Gowganda Silver Mines who turned over their interest to Placer Development in 1974. In 1980, Placer optioned this deposit to Billiton who completed 11 278 m of drilling and then dropped it in 1983. Extensive geological, geophysical and geochemical studies were carried out and the extensive drilling added 90 720 t to the ore reserves. In 1985 Lincoln Resources optioned the property. The property was optioned by Southwind Resources in 1986.

GEOLOGY The host rock is Ordovician sericite-chlorite and chlorite-sericite schist that overlies interbedded metaquartzite and metagreywacke. Conformable lenses of banded, massive to disseminated, fine-grained pyrite-sphalerite-galena-chalcopyrite-minor tetrahedrite plunge approximately 17° to the north-northwest. This zone is 490 m long and averages 90 m wide and 30 m thick. Mineralization outcrops to the south and has been traced to a vertical depth of 183 m to the north. Minor folds are common, and the host rock is chloritized adjacent to the mineralization.

RESERVES
2 375 915 t (0.34% Cu, 5.5% Pb, 6.8% Zn, 102.9 g/t Ag)
or
2 957 420 t (4.6% Pb; 5.9% Zn)

A bulk concentrate prepared by Teck Corporation contained 19% Pb, 28% Zn, 1.2% Cu, 0.05% Cd, 308.6 g/t Au, 15% Fe, 0.04% As, and 0.006% Sn.

DEVELOPMENTS In 1987, the property was transferred to Northumberland Mines Limited.

Stratmat Zinc-Lead-Copper-Silver 21 O/8E

LOCATION The Stratmat deposit is 5 km northwest of the Heath Steele deposit and about 50 km southeast of Bathurst in Northumberland County (Figure 16). (Lat. 47°18'N; Long. 66°07'W)

COMPANY Cominco Limited; Executive Office - 200 Granville Square, Vancouver, V6C 2R2. The Chairman is F.E. Burnett. The Vice President, Easter Region, is J.R.M. Douglas.

HISTORY The Main or Stratmat (East) Zone was discovered by Strategic Metals in 1956 following geophysical surveys. The company drilled holes 61-1 to 61-36 in 1956-57, then optioned the property to Cominco Limited in 1959. Cominco exploration led to the discovery of the West Zone in 1961, and the Stringer and Central zones in 1972. The West Zone lies on the boundary between the Heath Steele and Cominco properties.

Mineral dressing tests carried out at Heath Steele in 1982 were very successful. In 1987, R.R. Irrinki of the New Brunswick Department of Natural Resources and Energy, Geological Surveys Branch, completed an ore reserve estimation for the property. In 1986, the West Zone was drilled by Brunswick Mining and Smelting Corporation Limited to obtain metallurgical samples. Preliminary results indicated good grade zinc, lead and silver, and excellent recoveries.

GEOLOGY The Stratmat deposit comprises five sulphide deposits: Stratmat East (Main) Zone, Stratmat Central Zone, Stratmat West Zone A, Stratmat West Zone B, and Stratmat Stringer Zone. The nearby N-5 or Boundary Zone is closely related to the west zones, but is owned by Heath Steele Mines Limited.

The massive banded sulphides consist of fine- to medium-grained interbanded sphalerite-galena and pyrite, with local coarse-grained chalcopyrite hosted by argillite. Vaguely banded pyrite-chalcopyrite occurs locally. Disseminated grains and stringers of medium-grained pyrite and/or sphalerite with smaller amounts of galena and chalcopyrite occur in argillite and felsic tuff. The sulphide deposits and their host argillite are sandwiched between two polydeformed sequences of felsic crystal and lapilli tuffs ("Southwall and Northwall sequences"). One large gabbro dyke and several diabase dykes cut the supracrustal rocks of the Stratmat East Zone. All rocks are thought to be Middle Ordovician in age (Tetagouche Group). The shapes and attitudes of the sulphide-bearing zones are controlled by two sets of folds.

RESERVES Cominco reported reserves as follows:

Main Zone	635 029 t	(0.03% Cu, 1.8% Pb, 5.2% Zn, 65.1 g/t Ag
	453 592 t	(1.9% Cu)
Central Zone	181 437+ t	(0.5% Cu, 4.3% Pb, 8.0% Zn)
Stringer Zone	181 437+ t	(2.0% Cu)
West Zone	1 451 494 t	(2.9% Pb, 7.5% Zn, 30.9 g/t Ag)
Main East Depth	362 874 t	(0.7% Cu, 2.6% Pb, 12.2% Zn, 24.0 g/t Ag)
Heath Steele West Zone A		
N-2 (at depth)	544 310 t	(0.5% Cu, 3.6% Pb, 9.6% Zn, 78.9 g/t Ag)
N-5	544 310 t	(0.5% Cu, 3.2% Pb, 8.0% Zn, 30.9 g/t Ag)

DEVELOPMENTS Brunswick Mining and Smelting Corporation Limited began sinking a 2438 m exploratory decline in the latter part of 1987.

NONMETALLIC MINERALS[12,13]

Twelve applications for Peat Exploration Licences were under review in 1987: Satoturve Oy (Bog 324N); AMR Peat Inc. (Bog 16); Normand Leger (Bog 76); Acadian Peat Moss (1979) Ltd. (Bogs 3 and 582); Tourbière St-André Inc. (Bogs 301 and 301A);

Premier CDN Enterprises Ltd. (Bogs 306, 313 and 389); Fafard Peat Moss Co. Ltd. (Bog 552); Lamèque Peat Moss Ltd. (Bog 25). Applications for Bogs 16, 76, 301A and 582 have been rejected. Exploration licences have been granted to Satoturve Oy (Bog 324N) and to Acadian Peat Moss (1979) Ltd. (Bog 3). Bog 536 is currently held by Jiffy Products (N.B.) Ltd. under Peat Exploration Licence 82-3.

During 1987, nonmetallic mineral exploration in the Province was virtually static with the exception of some limited activity associated with graphite and dolomite occurrences, both located in Saint John County, limestone resources in Westmorland County, and gypsum in the Hillsborough area.

BP Resources Canada Ltd. (Selco Division) has not announced a decision to proceed with underground exploration of the Millstream potash property, 10 km west of Sussex.

PEAT[13]

Jiffy Products (N.B.) Ltd.

COMPANY Jiffy Products (N.B.) Ltd., P.O. Box 360, Shippagan, N.B. E0B 2P0. The General Manager is Gérard R. Mallet. Telephone: (506) 336-2284.

RIGHTS Peat Exploration Licence 82-3 (218 ha) on Bog 536, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 536 is located 8 km north of Tracadie, between Pont-Landry and Ste-Rose. Access is by dirt road off Highway 11 (Figure 16).

HISTORY Jiffy Products (N.B.) Ltd. acquired the Peat Exploration Licence in 1982.

RESERVES AND GRADE 5.64 Mm^3 surficial peat and 8.74 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	218	47	265
>1 m	201	19	220

Satoturve Oy

COMPANY Satoturve Oy SF-27130, Eurajoki As, Finland. The contact person is Mikko Voutilainen. Telephone: (938) 80 600.

RIGHTS Peat Exploration Licence 87-2 (1213 ha) on Bog 324N, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 324N is located 3 km south of Escuminac. Access to the bog is by logging roads off Highway 117 (Figure 16).

HISTORY Satoturve Oy applied for a Peat Exploration Licence in 1985. A licence was granted in 1987.

RESERVES AND GRADE 30.21 Mm^3 surficial peat and 8.74 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	1213	62	1275
>1 m	927	47	974

Acadian Peat Moss (1979) Ltd.

COMPANY Acadian Peat Moss (1979) Ltd., P.O. Box 240, Lamèque, New Brunswick E0B 1V0. Telephone (506) 344-2225. The President is Elphege Chiasson.

RIGHTS Peat Exploration Licence 87-1 (564 ha) on Bog 3, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 3 is located 10 km south of Bay du Vin. Access is by old woods road from Highway 11 (Figure 16).

HISTORY Acadian Peat Moss (1979) Ltd. applied for a Peat Exploration Licence in 1986. A licence was granted in 1987.

RESERVES AND GRADE 10.12 Mm^3 surficial peat and 2.86 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	564	3	567
>1 m	323	0	323

POTASH/SALT[12]

Millstream 21 H/12

COMPANY BP Resources Canada Ltd. - Selco Division, 55 University Avenue, Suite 1700, Toronto, Ontario M5J 2H7. The general manager is J. Hainey.

RIGHTS 10 056 ha Exploration Agreement, under Section 25(2) of the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION This property is located about 4 km east of Apohaqui and 10 km east of Sussex, Kings County (Figure 16).

HISTORY A drill hole (Millstream No. 1), completed in 1973 by the Department of Natural Resources, penetrated about 12 m of potash-bearing salt at a depth of 915 m, before it was abandoned because of technical difficulties. In May 1980, the Province called for tenders for the right to explore and develop a salt-potash prospect at Millstream and five tenders were received. After careful evaluation, the Province awarded the rights to BP Exploration Canada Ltd., now BP Resources Canada Ltd.

Between 1981 and 1983, 11 drill holes and related geological studies were completed to investigate the property. Results were extremely encouraging; numerous potash-bearing horizons were intersected at depths between 950 and 1050 m.

PRESENT OWNERSHIP BP Resources Canada Ltd. - Selco Division.

RESERVES AND GRADE Anticipated tonnages, and potash grades ranging from 20 to 30% K_2O are very encouraging.

PRODUCTION None.

DEVELOPMENT BP fulfilled the terms of its 1981 exploration agreement and successfully negotiated a Mining Lease with the New Brunswick government for this property (July 29, 1985).

Results from the surface drilling programme have been encouraging. However, BP continues to seek a suitable partner before proceeding with the next phase of the project, which includes shaft sinking and an underground exploration programme.

EMPLOYEES None.

DOLOMITE[12]

Lorneville 21 G/1E

COMPANY Great Horn Mining, Inc., Suite 1202, 67 Yonge St., Toronto, Ontario M5E 1J8.

RIGHTS 38.877 ha Exploration Agreement under Section 25(2) of the Mining Act, Chapter M-14.1, S.N.B., 1985.

LOCATION This property is located on the west coast of Lorneville Harbour, Saint John County, partially in the Lorneville Industrial Park. Access to the property is by paved Highway 810 approximately 1.5 km south of Highway 1, west of the City of Saint John (Figure 16).

HISTORY Interest in the Lorneville dolomite property can be traced back to the early 1970s when the deposit was initially investigated by Great Horn Mining Syndicate as a possible raw material source for the production of magnesium

metal. A detailed mapping and shallow drilling programme was undertaken to prove up the extent and quality of the deposit; however, interest in the property eventually subsided.

In 1986, Norsk Hydro As, a Norwegian company, announced plans to construct a $450 000 000 magnesium metal plant near Montreal. Although the company had indicated some interest in securing an eastern Canadian dolomite source of suitable quality and extent, it would appear that it will be purchasing high-grade MgO on the open market as feedstock for the plant. Because of the proximity of the supply source, the concept of a New Brunswick MgO producer could be an attractive alternative to feedstock shipped in from abroad for Norsk.

RESERVES AND GRADE A 1973 assessment of the deposit indicated dolomite reserves (to a depth of 30 m) in excess of 8 000 000 t grading 20.77% MgO.

PRODUCTION None.

DEVELOPMENT An Exploration Agreement between Great Horn Mining Inc. and the Minister of Natural Resources and Energy was negotiated in 1986. The company embarked on a limited drilling programme to further verify the extent and grade continuity at depth. Results appear encouraging.

BERYL[12]

Zealand Station 21 J/2W

COMPANY Shediac Bay Resources Inc., Suite 806, 88 University Avenue, Toronto, Ontario M5J 1T6

RIGHTS Property consists of 32 mineral claims encompassing an area of approximately 500 ha.

LOCATION This property is located in York County, near Zealand Station, approximately 40 km northwest of Fredericton (Figure 16).

HISTORY The Zealand Station beryllium occurrence has been worked periodically over the last 30 years. Stripping and trenching, detailed mapping and sampling, and related geochemical and geophysical surveys were carried out in 1985-86 by Shediac Bay Resources Inc.

RESERVES AND GRADE Estimated possible ore reserves of 147 000 t of ore grading 0.74% BeO.

PRODUCTION None.

DEVELOPMENT Detailed sampling in 1985-86 may stimulate further work on ore beneficiation and a subsequent drilling programme to determine the extent of the deposit at depth.

EMPLOYEES None.

GRAPHITE[12]

Golden Grove 21 H/5W

COMPANY Glenvet Resources Ltd., 177 King St. East, Saint John, New Brunswick E2L 4S5

RIGHTS Property consists of a block of 15 claims encompassing approximately 240 ha.

LOCATION The Golden Grove prospect is in the north-central part of Saint John County, approximately 25 km northeast of Saint John (Figure 16).

HISTORY Graphite was discovered at this location more than 50 years ago. In the 1930s numerous pits were excavated to investigate the occurrence; however, this occurrence had received only cursory attention prior to 1980. Work in 1982 and 1985 involved regional and detailed VLF EM and magnetometer studies, and trenching designed to further delineate the extent and quality of the occurrence.

RESERVES AND GRADE Trenching (1985) has apparently indicated a graphite horizon, 2 m in width and 425 m in strike length, which contains high-grade (30-38%) zones of carbon. Possible tonnage based upon the continuity of the material to depths of 150-300 m is estimated to be 225 000 to 450 000 t.

PRODUCTION None

DEVELOPMENT Recent geological and geophysical surveys have been relatively successful in further defining the extent of the occurrence; however, drilling will be required to verify the nature of the deposit at depth. Preliminary mineralogical and metallurgical test work appears to indicate considerable potential for the Golden Grove deposit as a source of flake graphite.

ENERGY RESOURCES

OIL SHALE[21]

Cartago Resources Ltd. 21 H/15E

COMPANY Cartago Resources Ltd., 304 - 2466 West 3rd Avenue, Vancouver, British Columbia V6K 1L8. Telephone: (604) 732-1958. The President is Walter W. Storm and the Manager is Gunter Allmann.

RIGHTS Bituminous Shale Licence to Search L85-01 comprising 8998 ha. The licence is issued under the Bituminous Shale Act, Chapter B-4.1, R.S.N.B. 1976.

LOCATION Licence to Search L85-01 occupies an approximately rectangular area in Westmorland County between the Petitcodiac and the Memramcook rivers. The area includes the villages of Belliveau, Dover, Memramcook, St. Joseph and Taylor Village (Figure 17).

HISTORY Oil shales have been known in the Westmorland County area for over 100 years. In 1942, the Canada Department of Mines and Resources drilled seven core holes at Taylor Village totalling 320 m. In 1967 and 1968, the Atlantic Richfield Company drilled five exploratory oil shale holes in the Dover, St. Joseph and Taylor Village areas.

The area was held under a Bituminous Shale Licence to Search by Canadian Occidental Petroleum from 1974 to 1981. They carried out an oil shale mapping survey and reported assay work on numerous surface samples.

Petro-Canada held a Bituminous Shale Licence to Search in the Westmorland County area from 1981 to 1984. They drilled 963 m of core in the three holes in the Dover and Boudreau Village areas.

EXPLORATION A modest proposal to carry out sampling and assay work on the Petro-Canada core has been submitted.

DEVELOPMENTS Trenching and limited assay work were undertaken to help confirm the thickness and grade of the oil shale zone.

OIL AND NATURAL GAS[22]

Chevron Canada Resources Ltd. — 21 H, 21 I/1,2,3,7

COMPANY Chevron Canada Resources Ltd., 500-Fifth Ave. S.W., Calgary, Alberta T2P 0L7. Telephone: (403) 234-5000. The President is G.G.L. Henderson.

RIGHTS ONG Onshore Licences to Search 80-1 to 80-29 (679 307 ha) through a 'farm-in' with Western Decalta Petroleum (1977) Ltd., and ONG Onshore Licences 83-4 and 83-5 (66 072 ha).

ONG Offshore Licences to Search 74-1 to 74-19 (509 983 ha).

All licences are issued under the Oil and Natural Gas Act, Chapter O-2.1, R.S.N.B. 1976.

LOCATION Licences to Search 80-1 to 80-29 include most of the Moncton and Westmorland subbasins, in addition to the portions of the New Brunswick Platform that border the Moncton Subbasin (Figure 17).

The offshore licences (74-1 to 74-19) cover almost all of the New Brunswick portion of the Bay of Fundy.

HISTORY Chevron Canada Resources and Irving Oil Ltd. formed a partnership and farmed into New Brunswick Oilfields Ltd. ONG Onshore Licences to Search 80-1 to 80-29.

In the Bay of Fundy, Chevron Canada Resources and Irving Oil Ltd. farmed into the Mobil-Gulf ONG Offshore Licences to Search 74-1 to 74-19.

EXPLORATION In 1986, one hole was drilled to a depth of 2100 m at Lee Brook, Albert County.

International Resources Limited 21 I/1,I/8

COMPANY International Resources Limited, 82 Germain St., Suite No. 1, Saint John, New Brunswick E2L 3Y2. The President is Mitchell Franklin.

RIGHTS ONG lic/on-sh 85-1 to 85-3 inclusive (34 780 ha total) under the Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976.

LOCATION ONG lic/on-sh 85-1 is located approximately 25 km northeast of Moncton, while ONG lic/on-sh 85-2 and 85-3 are located approximately 35 km north of Moncton (Figure 17).

HISTORY All three licences to search were acquired by International Resources Ltd. on April 1, 1986.

DEVELOPMENTS In 1987, the company relogged two drill holes: D'Arcy Cape Bald No. 2 and D'Arcy Buctouche No. 1. In November of 1987, International Resources surrendered ONG lic/on-sh 85-1 to 85-3, inclusive.

Millford Resources Ltd. 21 O/6

COMPANY Millford Resources Ltd., 232 Woodvalley Ct. S.W., Calgary, Alberta T2W 5L8. The President is D.L. Smith.

RIGHTS ONG lic/on-sh 86-1 (17 480 ha) under the Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976.

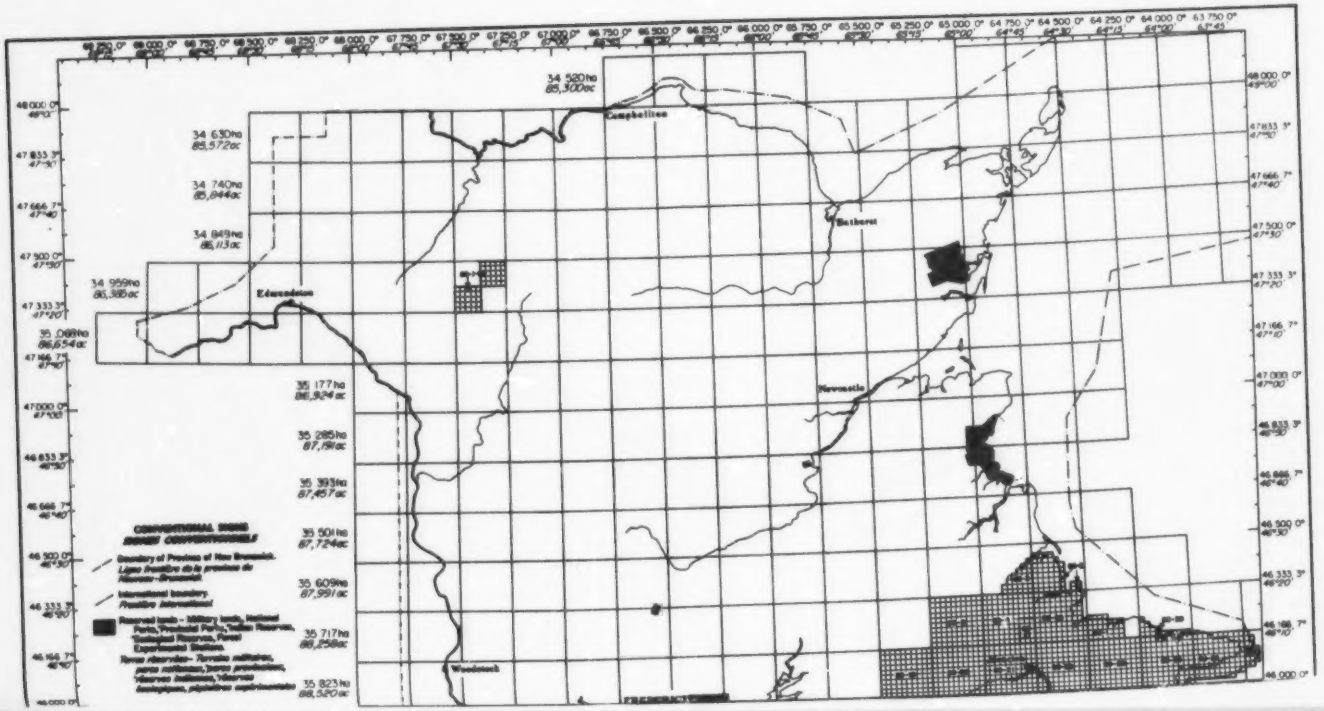
LOCATION ONG lic/on-sh 86-1 is located approximately 50 km northeast of Grand Falls (Figure 17).

HISTORY The single licence to search was acquired by Millford Resources Ltd. on March 14, 1986. A magnetometer survey was conducted in August, 1986, along with a literature search.

OUTLOOK The company will attempt to interest an oil company in the property based on a geological model.

Western Decalta Petroleum (1977) Limited
Chevron Canada Resources Limited
Irving Oil Limited 21 I

COMPANY Western Decalta Petroleum (1977) Limited, P.O. Box 2404, Calgary, Alberta T2P 2M7.


34 520ha
85,300ac
Campbellton
34 630ha
85,572ac
34 740ha
85,844ac
34 849ha
86,113ac
34 959ha
86,385ac
Edmundston
35 068ha
86,654ac
35 177ha
86,924ac
35 285ha
87,191ac
35 393ha
87,457ac
35 501ha
87,724ac
35 609ha
87,991ac
35 717ha
88,256ac
35 823ha
88,520ac
Bathurst
Newcastle
Woodstock
CONFIDENTIAL ZONES
ZONES CONFIDENTIELLES
Boundary of Province of New Brunswick
Ligne frontière de la province du Nouveau-Brunswick
International boundary
Frontière internationale
Reserved lands - Military lands, National Parks, Provincial Parks, Indian Reserves, Historical Reserves, Forest Experimental Stations
Terres réservées - Terrains militaires, parcs nationaux, parcs provinciaux, réserves indiennes, réserves historiques, stations expérimentales

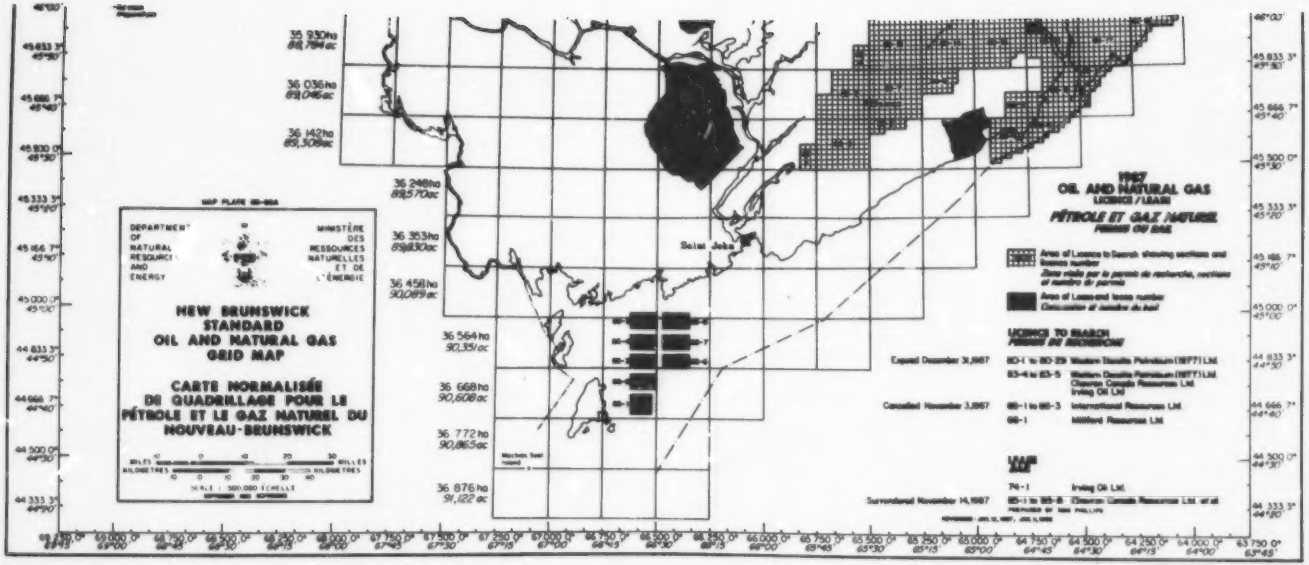


Figure 17. Location of bituminous shale licences to search and oil and natural gas Leases and licences to search, 1987.

Chevron Canada Resources Limited, 500-Fifth Ave. S.W., Calgary, Alberta T2P 0L7.

Irving Oil Limited, P.O. Box 1421, Saint John, New Brunswick E2L 4K1.

RIGHTS ONG lic/on-sh 83-4 and 83-5 (66 072 ha) under the Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976.

LOCATION ONG lic/on-sh 83-4 is located 15 km north of Moncton; ONG lic/on-sh 83-5 is located 25 km northwest of Moncton (Figure 17).

HISTORY Licences to Search 83-4 and 83-5 were issued in October, 1983.

A gravity survey and seismic programme conducted in 1983 and 1984 by Chevron Canada Resources Limited included portions of licences to search 83-4 and 83-5.

To satisfy work requirements of ONG lic/on-sh 83-4 and 83-5, approval was given to group these licences with ONG lic/on-sh 80-8.

Chevron Canada Resources Limited, et al. 21 G/2
21 B/10,15,16

COMPANY Chevron Canada Resources Limited, 500-5th Avenue S.W., Calgary, Alberta T2P 0L7. The President is G.G.L. Henderson.

RIGHTS ONG lse/off-sh 85-1 to 85-8 inclusive (44 269 ha), Bay of Fundy, under the Oil and Natural Gas Act, Chapter O-2.1 R.S.N.B. 1976.

LOCATION ONG lse/off-sh 85-1 to 85-8 inclusive are located in an area of the Bay of Fundy approximately 50 km southwest of Saint John (Figure 17).

HISTORY Leases 85-1 to 85-8 inclusive were issued November 15, 1985. Chevron Canada Resources Ltd. is the operator on behalf of the interest holders. They are as follows: Irving Oil Ltd., Canadian Hunter Exploration Ltd., Mobil Oil Canada Ltd. and Canada Northwest Energy Ltd.

DEVELOPMENTS In March 1987 Mobil Oil Canada Ltd. transferred its entire working interest in ONG lse/off-sh 85-1 to 85-8 inclusive to Chevron, Irving and D.W. Axford & Associates Ltd. In November 1987 Chevron, as operator on behalf of itself and partners, surrendered the entire interest held in the above subject leases.

CHAPTER 3. MINE DEVELOPMENT IN NEW BRUNSWICK

METALLIC MINERALS[16]

The much improved prices being received for metals have had a positive effect on the mineral industry in New Brunswick. A number of operations previously closed should be starting up in the immediate future, with several other sites being reevaluated for their development potential. The forecast for prices appears good and it is hoped that this will result in a number of new properties developing in the near future.

Due to the previously depressed state of the base metal market, exploration interest has been focused in other areas, such as precious metals. The return of a strong and hopefully persistent base-metal climate will result in an even more diverse mineral industry for the Province.

Lac Minerals Limited (Mount Pleasant) 21 G/7W

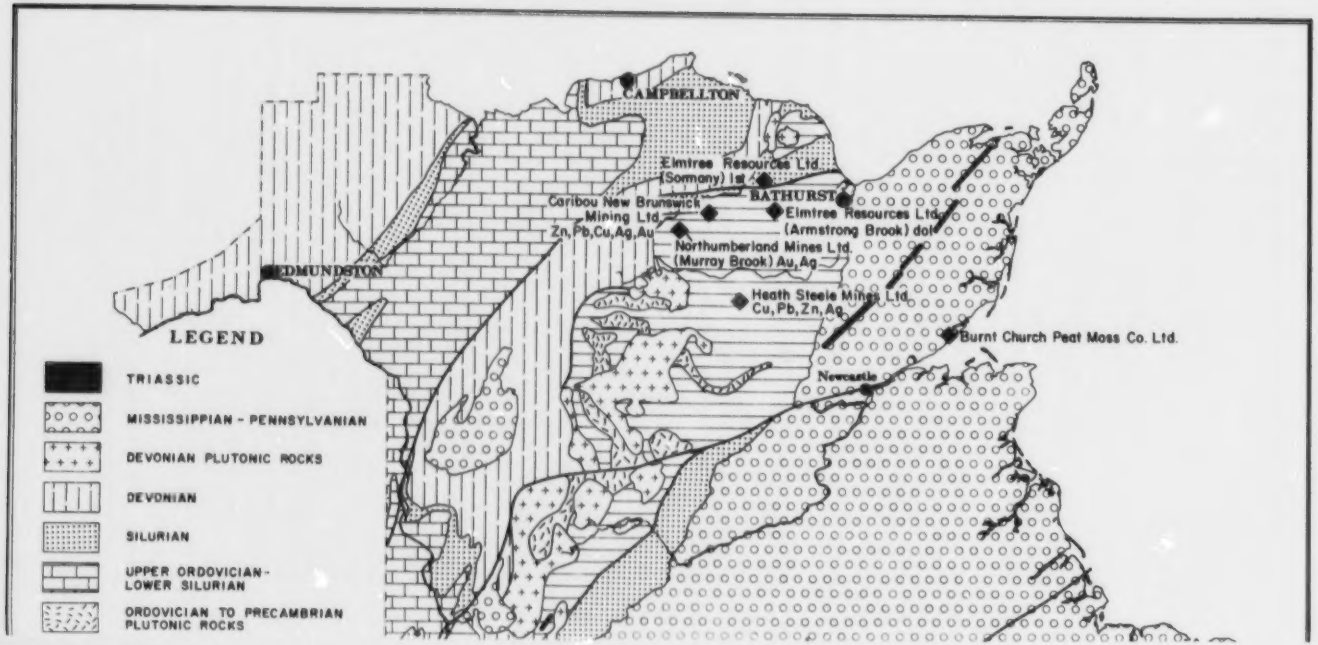
LOCATION The Mount Pleasant property is about 50 km northeast of St. Stephen, Charlotte County (Figure 18).

HISTORY A group called Geochemical Associates staked Mount Pleasant in 1954 for Selco Exploration Ltd. Selco drilled four holes in a geochemical anomaly, but no metallic minerals of interest were intersected and the property was returned to Geochemical Associates.

In 1956, Kennco Exploration (Canada) Limited optioned the property and drilled ten holes, but the results were disappointing and Kennco dropped the option. Mount Pleasant Mines Ltd. staked the ground in 1959. Kennco optioned the property again and drilled several holes that intersected tungsten, molybdenum and tin minerals, but the option was dropped again because the mineralized zone could not be followed.

In 1960, a trenching and diamond-drilling programme combined with a detailed geological investigation by the Mount Pleasant Mines geological staff led to the discovery of a tin-base-metal ore zone in the northern part of the property. This ore zone is commonly referred to as the North Zone deposit. Deep drill holes also intersected tungsten-molybdenum ores in the northern part of the property (North Zone) and in the Fire Tower Zone (Mount Pleasant), but lack of sufficient funds prevented systematic drilling of these deeper ore zones. The delineation of the complex geology of the property guided subsequent exploration by Sullico Mines Ltd. This company optioned the property in 1967. Drilling by Sullico and later its wholly-owned subsidiary Brunswick Tin Mines Limited led to the delineation of the tungsten-molybdenum ore zones in the Fire Tower Zone and the North Zone.

In 1977, Billiton Canada Limited and Brunswick Tin Mines Limited made a joint venture agreement to bring the Fire Tower Zone's tungsten-molybdenum orebody (Fire Tower Zone West) into production. Mill construction and underground work were


CAMPBELLTON
Eimtree Resources Ltd
(Sormany) 1st
BATHURST
Caribou New Brunswick
Mining Ltd
Zn, Pb, Cu, Ag, Au
Eimtree Resources Ltd
(Armstrong Brook) do
Northumberland Mines Ltd.
(Murray Brook) Au, Ag
EDMUNDSTON
Heath Steele Mines Ltd
Cu, Pb, Zn, Ag
Burnt Church Peat Moss Co. Ltd.
Newcastle
LEGEND
TRIASSIC
MISSISSIPPIAN - PENNSYLVANIAN
DEVONIAN PLUTONIC ROCKS
DEVONIAN
SILURIAN
UPPER ORDOVICIAN-
LOWER SILURIAN
ORDOVICIAN TO PRECAMBRIAN
PLUTONIC ROCKS

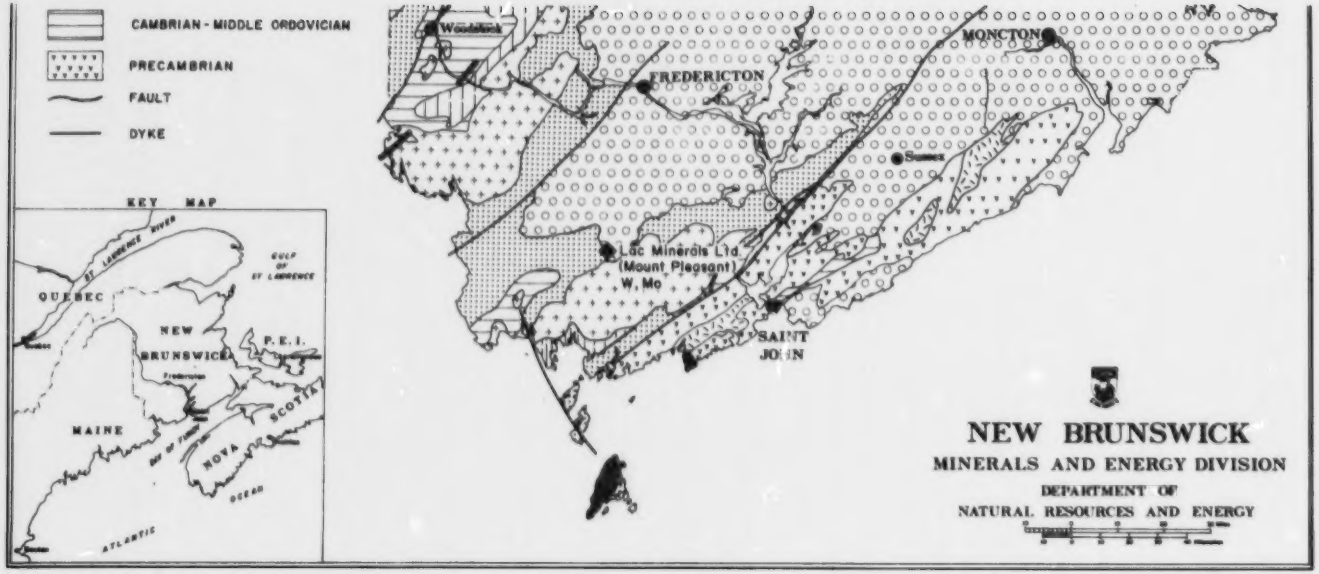


Figure 18. Mine properties in development stage in New Brunswick in 1987.

completed in 1983 when the first concentrates were produced. Commercial production started in 1984. The mine operated until July 31, 1985 and was forced to close as a result of very poor tungsten and metal prices.

On October 1, 1985, Lac Minerals entered a 50/50 joint venture agreement with Billiton to explore and possibly develop the North Zone tin deposit, located 1 km north of the present mine site.

COMPANY The Lac/Billiton tin project is operated by Lac Minerals Ltd. with head offices at 2105 N. Tower, P.O. Box 156, Royal Bank Plaza, Toronto, M5J 2J4. Mine Office address is P.O. Box 150, St. George, New Brunswick, E0G 2Y0. The President is P. Allen and Vice-President (Expl.) is R. Valliant; Resident Geologist is G. Kooiman.

RESERVES: (Published)

Zone	Reserves(t)	WO_3(%)	MoS_2(%)	Sn(%)
Fire Tower	12 220 000	0.38	0.2	
North	5 900 000			0.79

PRODUCTION There has been no production since 1985 and none is planned.

DEVELOPMENTS Since October 15, 1985, Lac Minerals has completed 2100 m of underground development to provide drill access to areas of the deposit where additional information was required. To the end of December, 1987, 18 124 m of underground drilling and 3364 m of surface drilling have been completed. Two bulk samples from underground totalling 2652 t have been processed at the site and sent off for metallurgical analysis. A feasibility study regarding the mining and processing of tin from the site was completed in late 1987 and is presently under review; a decision regarding this study will be made in 1988.

The site is presently on a care-and-maintenance program with the underground workings having been flooded in August 1987. A mine licence evaluation programme will commence in June, 1988 to explore for any other mineral occurrences on the property.

EMPLOYEES At the end of 1987 there were 6 employees on site.

Heath Steele Mines Limited 21 O/8W

LOCATION The Heath Steele mine is located 51 km northeast of Newcastle in Northumberland County (Figure 18). (Lat. 47°17'N and Long. 66°05'W)

HISTORY The deposit was discovered in 1954 by airborne electromagnetic surveying. Mining began in 1957 but was suspended between 1958 and 1962 because of low metal prices

and poor recoveries. The mine reopened in 1962 with a contract to treat the ore from Cominco's Wedge mine. In 1968, the mine began operating under the name Little River Joint Venture, managed and owned 75% by AMAX and 25% by INCO. In 1979, Noranda acquired AMAX's 75% share and ASARCO acquired INCO's 25% share.

On April 29, 1983 sulphide operations ceased due to low metal prices and diminished revenues. The plant was converted to treat gossan ores in order to recover gold and silver. This cyanide treatment process started in July 1983. After some start-up problems, the plant operated well, treating a peak of 517 t/d. The gossan operations continued until October 1984.

In 1986 Brunswick Mining and Smelting acquired ASARCO's 25% share in the mine.

COMPANY The mine operates under the name Heath Steele Mines Limited with head offices at P.O. Box 45, Commerce Court West, Toronto, Ontario M5L 1B6. The mine office address is P.O. Box 4000, Newcastle, New Brunswick E1V 3M5. The President is J.C. White; the Senior Vice-President is J.W. Moerman and the Project Superintendant is D. Archibald.

RESERVES Mineral Inventory (December, 1986)

Reserves (t)	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)
15 177 200	1.24	1.63	5.03	60.34	0.62

DEVELOPMENTS Heath Steele Mines Limited has continued to keep the mill in good condition and to maintain the property with respect to environmental requirements.

With the improved prices of lead and zinc, as well as promising surface drill results, Heath Steele has embarked on an underground exploration program of the Stratmat Boundary property, located approximately 6 km from the main mine/mill site. Once drilling and metallurgical testing are completed, it is anticipated that the mine could reopen, processing ore from a combination of existing sites as well as the Stratmat zone. If this happens the operation would run at 1800 t/d and employ approximately 200 people. Approximately $7 000 000 will be expended by Heath Steele Mines on this project and the Minerals and Energy Division is continuing its geological structure study, which is jointly funded under the Canada-New Brunswick Mineral Development Agreement for $214 000.

EMPLOYEES At the end of 1987, there were 26 regular and 34 contract employees on site.

Gordex Minerals Limited (Cape Spencer) — 21 H/4W

LOCATION The Gordex Minerals Limited gold property is located at Cape Spencer, 15 km southeast of the City of Saint John, along the Bay of Fundy coast (Figure 18).

HISTORY Minor amounts of gold were found near the lighthouse several years ago. The property was staked in 1979-1980 by Mr. Morton Gordon. An intensive exploration programme conducted during the summer of 1982 led to the delineation of an extensive alteration zone with numerous gold-bearing quartz veins. Gordex Minerals Limited mined 30 000 t of ore from its surface workings on the Cape Spencer gold deposit in 1985 and has received permission from the appropriate provincial departments to operate a 30 000 t demonstration plant to leach gold from the ores. In addition, another 15 000 t was placed on the heap pad in 1986. The leaching of the gold with $Ca(CN)_2$ was carried out in the summer of 1986 and the recovery of gold from the demonstration heap leach was successful. At the end of the year, Gordex was carrying out a substantial exploration programme to confirm ore reserves in the Cape Spencer area.

COMPANY The mine is owned by Gordex Minerals Limited with offices at P.O. Box 7071, Station A, Saint John, N.B. E2L 4S5. The President of Gordex Minerals Limited is Mr. H.E. Pawson.

RESERVES (Published) 671 328 t of ore, grading 3.3 g/t Au, has been outlined on the property to a depth of 152 m. The property has potential reserves of 3 000 000 t.

DEVELOPMENTS During 1987 several modifications were made to the gold extraction procedure at Cape Spencer. The heap leaching operation was converted to an earthen vat leaching process. This provides a better means of controlling extraneous water from diluting the leach cycle. At the same time the gold extraction mechanism was converted from a zinc precipitate to a carbon-in-pulp treatment. Both these changes have resulted in better recoveries of gold.

Approval was received to mine for a two-year period and process a total of 310 000 t of ore. In 1987, an additional 50 000 t of ore was processed while plans for 1988 indicate 200 000 t will be extracted and treated.

A modified effluent treatment process was also implemented in 1987, which met with limited success; further modifications will be made in 1988.

EMPLOYEES At the end of 1987 the operation had a staff of 6 with 19 contracted employees on site.

Caribou New Brunswick Mining Limited 21 0/9W

LOCATION The Caribou deposit is approximately 40 km west of Bathurst in Restigouche County (Figure 18). (Lat. 47°34'N; Long. 66°17.6'W)

HISTORY The mineralization was discovered in late 1955 by Anaconda Copper Mining Company through regional geological mapping using aeromagnetic maps and photo interpretation. Ground EM pinpointed the drill target. Anaconda excavated an adit in the late 1950s, and in the late 1960s and early 1970s an incline was driven from the adit. Coincidentally, a 907 t/d mill with a copper concentrator was constructed. Mining of secondary (near-surface) copper took place between November, 1970 and November, 1971. Metallurgical problems caused shut-

down. Production resumed in September, 1973 and continued for one year. Extractive metallurgical research on lead-zinc-copper ore is continuing. In 1983 heap leaching of gossan was completed. Gold and silver extracted in 1983 amounted to 88 582.77 g and 1 688 018 g, respectively. In late 1986, East West Minerals, N.L. of Sydney, Australia acquired Anaconda Canada Exploration Limited and Caribou Chaleur Bay Mines Ltd., which constitute the Caribou property.

COMPANY Caribou New Brunswick Mining Limited, P.O. Box "A", Bathurst, N.B. E2A 3Z1. Head Office is East West Minerals, Inc., 3 Harbor Drive, Suite 103, Sausalito, California 94965. The Chief Executive Officer is Mr. Tony D.S. Wicks; Mine Manager is C. Smith.

RESERVES Currently under review in conjunction with an on-going underground exploration programme.

PRODUCTION Secondary copper ore (825 552 t) was extracted from the open pit between November, 1970 and September, 1974. The average grade was 3.4% Cu.

DEVELOPMENTS A decision was made in 1987 to proceed with the construction of a 2000 t/d mine/mill that would produce a lead-zinc bulk concentrate, suitable for feedstock to an Imperial Smelting Furnace. Work on the mill was commenced in the latter part of 1987. At the same time definition drilling was started to enable detailed underground design work to take place. Enlargement of the underground access ramp also began at about this time. The tailings pond "Starter Dam" was completed to a height of 12 m in November. All required applications for final government approval have been submitted and are presently under review.

A public meeting was held at Bathurst, in December of 1987 to enable people to voice any concerns they may have with respect to the project. The meeting was very well attended and response to the project was positive.

Northumberland Mines Limited (Murray Brook) 21 O/09W

LOCATION The Murray Brook sulphide deposit is located approximately 80 km west of Bathurst (Figure 18).

HISTORY The deposit is one of more than 30 polymetallic massive sulphide bodies outlined in the 1950s. Northumberland Mines Limited optioned the property from Kennco Explorations (Canada) Ltd. in 1985 and is primarily interested in the precious-metal content of the gossan.

COMPANY The Murray Brook project is operated by Northumberland Mines Ltd. Northumberland has recently agreed to join with NovaGold Resources Ltd. and at present NovaGold holds 100% of Northumberland's stock. It is expected that this merger will be complete by late 1988.

The head office for NovaGold is: Second Floor, 1583 Hollis St., Halifax, Nova Scotia, B3J 1V4. The President is Mr. Gerald J. McConnell and the Vice-President of Canadian Operations is Dr. William L. Young, P. Eng.

RESERVES A preliminary pit evaluation programme indicates a mineral reserve of 1 700 000 t of gossan grading approximately 1.15 g/t Au and 46.34 g/t Ag.

DEVELOPMENTS Northumberland Mines Ltd. submitted a feasibility report, including a reclamation plan, in late 1986. Both of these were subsequently approved by the appropriate provincial government agencies, thus permitting Northumberland to proceed with the initial stages of mine development, on the Murray Brook site.

As was common with other smaller operators in the mineral industry, raising of capital for development proved to be difficult after the October 19, 1987 stock market incident. As a result, Northumberland has chosen to join with NovaGold Resources Ltd., a Nova Scotia-based resource company, with holdings in Nova Scotia, New Brunswick, Nevada and New Mexico.

The proposed operation will be a 1000 t/d open pit mine, utilizing a vat leaching process to extract the precious metals from the crushed and agglomerated ore. Reserves would indicate a mine life of approximately 5 to 6 years, employing 25 to 30 people.

NONMETALLIC MINERALS[12,13]

One peat moss company was in a development stage in 1987: Burnt Church Peat Moss Co. Ltd. (Figure 18)

Elmtree Resources Ltd. continued development work on the high-grade calcic limestone deposit at Sormany, although plans for quarrying a dolomite deposit near Armstrong Brook have been delayed (Figure 18).

PEAT[13]

Burnt Church Peat Moss Co. Ltd.

COMPANY Burnt Church Peat Moss Co. Ltd., P.O. Box 78, Shippagan, New Brunswick E0B 2P0. Telephone: (506) 336-2312. The Manager is Julien Mourant.

RIGHTS Peat Moss Lease No. 22 (202 ha) on Bog 353, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 353 is located 3 km southwest of Burnt Church, Northumberland County (Figure 18).

HISTORY The company acquired a Peat Exploration Licence in 1981 and converted to a Peat Moss Lease in 1983.

RESERVES AND GRADE 9.26 Mm^3 of surficial peat and 1.06 Mm^3 of humified peat on total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	90	237	327
> 1 m	67	188	255

DEVELOPMENT Site preparation included land clearing, access road upgrading and pouring of concrete pad for processing plant.

LIMESTONE/DOLOMITE[12]

Elmtree Resources Ltd. 21 O/9

(Sormany Limestone)

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas, and the Manager and Vice-President is G.M. Doucet.

RIGHTS 84.3 ha Quarry Lease No. 27 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

163.5 ha Mining Licence No. 1345 and 16.2 ha Claim Block 993 under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION This deposit is located about 30 km west of Bathurst, adjacent to the Millstream River (Figure 18).

HISTORY Although the limestones near Sormany were mapped by Davies in 1959, it was not until 1982 that Elmtree Resources Ltd. mapped and sampled the deposit in detail. Two holes were drilled to further test the extent and grade continuity of the limestone at depth. Results were encouraging enough to proceed with site preparation for quarry development.

PRESENT OWNERSHIP Elmtree Resources Ltd.

RESERVES AND GRADES Results indicated an excess of 4 000 000 t of high-grade calcic limestone (53.0% CaO) suitable for quicklime and hydrated lime production.

PRODUCTION Some stone has been quarried and hauled to the main crushing facility at Elmtree, where it has been marketed as agricultural (ag) lime and smelter flux (see Elmtree Resources Ltd. Armstrong Brook dolomite, below).

DEVELOPMENT In 1987, some stone was hauled to the crushing facility at Elmtree where it was marketed as ag lime.

EMPLOYEES Manpower was provided by staff of Elmtree Resources Ltd.

Elmtree Resources Ltd. 21 P/12W
(Armstrong Brook Dolomite)

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas, and the Manager and Vice-President is G.M. Doucet.

RIGHTS 59.10 ha Quarry Lease No. 26 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

161.1 ha Mining Licence No. 1344, under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION This dolomite deposit is located about 22 km west of Bathurst, Gloucester County (Figure 18).

HISTORY The deposit was found several years, perhaps decades, ago. It appears to have been used by local farmers, since the ruins of old kilns are present in the area. The deposit was rediscovered by Anaconda geologists in the 1950s while exploring for sulphide deposits. It was briefly investigated by J.W. McCarthy in the early 1970s and staked by Elmtree Resources Ltd. in 1982. An access road was constructed in 1983 and limited production for testing purposes was undertaken.

PRESENT OWNERSHIP Elmtree Resources Ltd.

RESERVES AND GRADE Exploration and development work by Elmtree Resources Ltd. has resulted in the delineation of more than 2 000 000 t of dolomite grading up to 37% $MgCO_3$.

PRODUCTION None.

DEVELOPMENT Plans to install additional crushing equipment for production of dolomitic ag lime and construction stone have been delayed.

EMPLOYEES Manpower was provided by the staff of Elmtree Resources Ltd.

ENERGY RESOURCES

OIL SHALE[21]

Canadian Occidental Petroleum Limited 21 H/15E

COMPANY Canadian Occidental Petroleum Limited, 1500, 635-8th Avenue S.W., Calgary, Alberta T2P 3Z1. Telephone: (403) 234-6700. The President is J. Angus McKee and the General Manager (oil shales) is E. Yildirim.

RIGHTS The company retains a 1439 ha Bituminous Shale Development Permit L77401 under the Bituminous Shale Act, Chapter B-4.1, R.S.N.B. 1976.

LOCATION The permit tract lies in the Albert Miners area about 25 km south-southeast of Moncton in Albert County (Figure 17).

HISTORY Bituminous shale was first reported at Albert Mines by Dr. Abraham Gesner in 1841. The area is best known for the solid hydrocarbon (albertite) vein that was discovered there by John Duffy in 1851. The vein was mined out between 1852 and 1880.

The importance of the oil shales first gained attention between 1854 and 1856 when Dr. Gesner retorted a burning oil from them. Following the closure of the albertite mine in 1880, the area attracted little interest until 1902 when R.W. Ells of the Canada Department of Mines drilled 36 shallow core holes near the old mine. In 1968, the Atlantic Richfield Company Limited drilled two holes at Albert Mines. One of these holes assayed 63 L/t shale oil over 130 m.

PRESENT OWNERSHIP Canadian Occidental Petroleum Limited is a public company, with 48% ownership by Occidental Petroleum Limited and 52% by shareholders.

RESERVES AND GRADES In 1942, the Canada Department of Mines estimated that there were 90 900 000 t of oil shale averaging 44 L/t, yielding about 47 700 m^3 (300 000 barrels) of shale oil to a depth of 120 m. In 1982, the Geological Survey of Canada and the New Brunswick Department of Natural Resources estimated that there were about 42 925 000 m^3 (270,000,000 barrels) of oil in situ to a depth of 600 m.

PRODUCTION In 1974, Canadian Occidental Petroleum Limited acquired the rights to the Albert Mines area by means of a Bituminous Shale Licence to Search covering 404 700 ha in southeastern New Brunswick. They converted this licence in 1981 to a lease of about 29 138 ha. Between 1974 and 1981 nine core holes were drilled and a high-grade oil shale zone was partially delineated. In 1983, the lease area was reduced to 1439 ha.

In 1986, Canadian Occidental completed a resource evaluation study which began in 1984. This evaluation provided the basis for a mine evaluation plan for the Albert Mines site. A general plan for large-scale mining and a plan for excavating 40 000 to 50 000 t of shale from a small test pit have been submitted. The test pit sample will be provided to the New Brunswick Electric Power Commission to run in their Chatham circulating fluidized-bed cocombustion demonstration plant in 1986.

In the past, Canadian Occidental has provided several tonnes of oil shale to Umatac Industrial Processes of Alberta, Lurgi GmbH of Germany, and the New Brunswick Electric Power Commission. The samples will provide additional data on retorting and fluidized bed combustion characteristics of Albert Mines oil shale.

CHAPTER 4. PRODUCING MINES AND QUARRIES IN NEW BRUNSWICK

VALUE OF PRODUCTION[16]

The total value of minerals produced in the Province in 1987 was $700 709 000, up approximately 40% from the total of 501 570 000 for 1986 (Tables 3 and 4, Figure 19). The increase stems from higher metal prices and increased production. Of the total value, metallic minerals account for 69%, nonmetallic minerals 20%, structural materials 6%, and fuels 5%.

On a province-by-province basis in 1987, New Brunswick ranked first in antimony and bismuth; second in potash and peat; third in zinc, silver, and lead; fourth in stone; and fifth in coal, and copper (Table 5).

Zinc, in the form of sulphide concentrates produced by Brunswick Mining and Smelting Corporation Limited accounted for $294 816 000 (40%) of the total value of minerals produced. Lead and silver extracted at the company's Belledune smelter, accounted for $83 960 000 (12%) and $62 248 000 (8%), respectively. Copper ($18 673 000), bismuth ($1 874 000), gold ($8 417 000), antimony ($10 797 000), and cadmium ($346 000) also contributed to the total value for metal production ($481 131 000). This value repesents a 54% increase over the 1986 final value of $312 466 000 (Figure 19).

The nonmetallic minerals, valued at $142 539 000, comprise potash, salt, peat, silica, and sulphur. This represents an increase of 20% over the 1986 final value of $118 813 000 (Figure 19). This increase is due mainly to improved production at both potash mines.

Fuels (including coal, natural gas, and petroleum crude) increased in value to $32 827 000 in 1987, from the 1986 final value of 28 027 000. This represents an increase of 17% (Figure 19).

Structural materials increased marginally for 1987 to $44 212 000 from the 1986 final figure of $42 264 000. These commodities comprise clay, cement, lime, sand, gravel and stone.

Overall, the mineral industry in New Brunswick has strengthened significantly in the past year and has contributed even more to the Province's diverse resource-based economy. The improvement in metal prices could result in several projects coming on stream in the near future and many more sites being reevaluated for their potential. Figure 20 shows the location of the nonrenewable resource producers in the Province.

EMPLOYMENT[16]

Employment in the mineral industry was up significantly from the previous year, from an average total of 4096 in 1986 to 4345 in 1987. This improvement can be attributed mainly to the recovery in mineral prices over the year, which resulted in new projects being developed as well as existing operations being upgraded.

Table 3.
Mineral Production
New Brunswick
1987

Preliminary Estimate

METALS	Units	Quantity	Value ($)
Antimony	kg	---	10 797 000
Bismuth	kg	177 000	1 874 000
Cadmium	kg	61 000	346 000
Copper	kg	7 767 000	18 673 000
Gold	g	442 000	8 417 000
Lead	kg	79 433 000	83 960 000
Silver	kg	208 000	62 248 000
Zinc	kg	231 410 000	294 816 000
TOTAL			481 131 000
NONMETALS			
Peat	t	241 000	25 288 000
Potash	t	---	---
Silica*	t	---	---
Salt	t	---	---
Sulphur (in smelter gas)	t	91 000	11 140 000
TOTAL			142 539 000
FUELS			
Coal	t	550 000	32 800 000
Natural Gas	m^3	1 000 000	14 000
Petroleum Crude	m^3	---	13 000
TOTAL			32 827 000
STRUCTURAL MATERIALS			
Clay products		---	2 850 000
Cement		---	9 285 000
Lime**		---	---
Sand and Gravel	t	9 650 000	---
Stone	t	2 465 000	13 750 000
TOTAL			44 212 000
GRAND TOTAL 1987, Preliminary (CDN $)			$700 709 000
GRAND TOTAL 1986 (CDN $)			$501 570 000

* Formerly reported as "Quartz"
** Includes all limestone products except aggregate

Table 4.

Mineral Production in New Brunswick
1976 to 1987

Calendar Year	Metals ($)	Nonmetallic Minerals ($)	Fuels ($)	Structural Materials ($)	Total ($)
1976	195 340 976	7 163 466	5 988 243	30 090 493	238 583 178
1977	238 583 350	10 037 550	6 333 791	34 439 352	289 394 043
1978	281 770 379	11 467 716	8 811 135	37 670 743	339 719 973
1979	419 123 591	11 658 369	10 394 844	38 510 412	479 687 216
1980	302 674 000	13 192 293	17 282 186	40 981 000	374 129 479
1981	452 580 000	16 666 976	23 325 535	39 769 000	532 341 511
1982	409 832 000	20 587 126	24 630 614	43 241 000	498 290 740
1983	421 281 000	19 220 800	29 707 000	38 385 000	508 593 800
1984	497 981 000	47 973 438	29 837 000	42 178 000	617 969 438
1985	364 825 000	62 025 000	31 626 000	43 727 000	502 203 000
1986	312 466 000	118 813 000	28 027 000	42 264 000	501 570 000
1987(P)	481 131 000	142 539 000	32 827 000	44 212 000	700 709 000

The following gives employment by sector in the mineral industry for 1987: Metals - 2405; Potash - 872; Coal - 216; peat - 708; Structural Materials - 144.

Scientific, technical, administrative and casual personnel employed by the Province in support of mineral resource development totalled 62 during 1987.

METALLIC MINERALS[16]

Brunswick Mining and Smelting Corporation Limited 21 P/5W

Brunswick operates one mine (No. 12), a concentrator, a lead smelter and a fertilizer plant.

LOCATION: The Brunswick No. 12 mine is located about 24 km west of Bathurst in Gloucester County (Lat. 47°28.5'N and Long. 65°53.5'W). The concentrator is adjacent to No. 12 mine (Figure 20). The lead smelter is located at Belledune Point, about 45 km from the No. 12 mine.

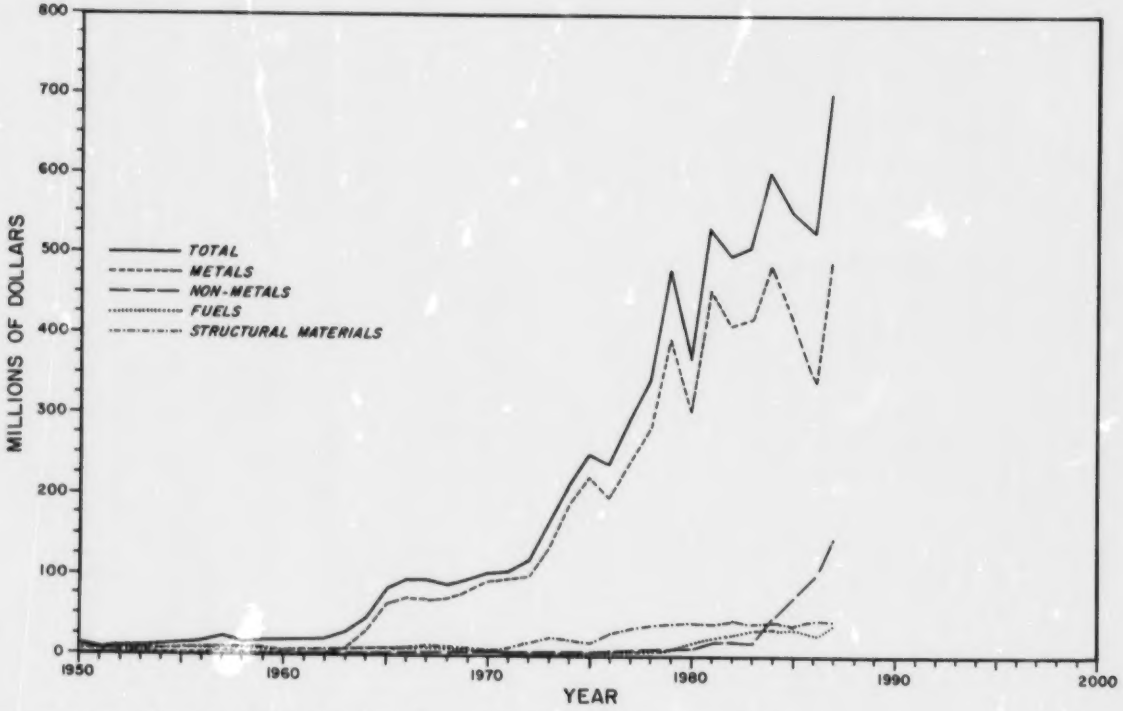


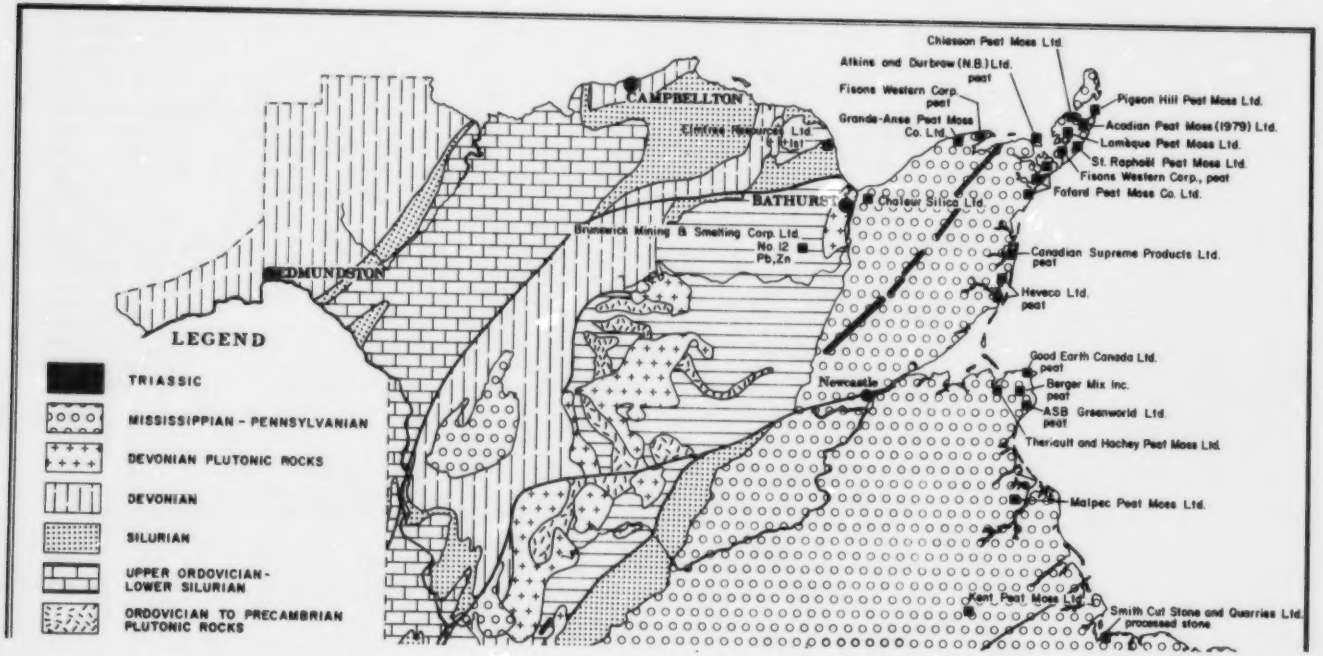
Figure 19. Value of mineral production in New Brunswick, 1950-1987.

Table 5.

Rank of Provinces and Territories, in Value of Production
for Leading Minerals in Canada, 1986 (p)

Mineral	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Y.T.	N.W.T.	Total Value Canada ($ millions)
Petroleum, Crude			7	8		6	5	2	1	3		4	11 992 672
Natural Gas				6		4		3	1	2		5	4 310 674
Gold	8		10	7	2	1	6	9	11	3	5	4	2 242 858
Copper				5	4	2	3	6		1	7		1 844 588
Zinc	8			3	6	2	7	9		5	4	1	1 693 665
Coal			3	5				4	2	1			1 635 000
Cement	8		6	9	2	1	5	7	3	4			976 025
Sand and Gravel	7*	10*	6*	X	X	1*	4*	5*	2*	3*	8*	9*	729 147
Potash				2				1					705 826
Stone	7		4	4	2	1	3		8	5	10	9	547 495
Lead				1		5	6			4	2	1	412 761
Silver	7		8	3	5	2	6	8		1	4	7	373 681
Salt			X	X	X	1*		2*	3*				235 420
Clay Products	9		4	8	2	1	7	6	3	5			210 208
Sulphur, in Smelter Gas			3	6	1	5				6		2	93 269
Peat	4*		X	2*	1*	X	X	X	3*	X			82 384
Quartz	5*		X	X	1*	2*	X	X	3*	4*			44 307
Antimony				1						2	3	4	13 158
Cadmium	7			6	5	1	4	9		2	8	3	13 050
Bismuth				1		4				3	2	5	1 891

X - Confidential information under the Statistics Act.
* - Rank determined using available information only.


LEGEND
TRIASSIC
MISSISSIPPIAN - PENNSYLVANIAN
DEVONIAN PLUTONIC ROCKS
DEVONIAN
SILURIAN
UPPER ORDOVICIAN - LOWER SILURIAN
ORDOVICIAN TO PRECAMBRIAN PLUTONIC ROCKS
CAMPBELLTON
EDMUNDSTON
BATHURST
Newcastle
Chaleur Silica Ltd.
Brunswick Mining & Smelting Corp. Ltd. No. 12 Pb, Zn
Chiasson Peat Moss Ltd.
Atkins and Durbrow (N.B.) Ltd. peat
Fisons Western Corp. peat
Grande-Anse Peat Moss Co. Ltd.
Pigeon Hill Peat Moss Ltd.
Acadian Peat Moss (1979) Ltd.
Lamèque Peat Moss Ltd.
St. Raphaël Peat Moss Ltd.
Fisons Western Corp., peat
Fafard Peat Moss Co. Ltd.
Canadian Supreme Products Ltd. peat
Heveco Ltd. peat
Good Earth Canada Ltd. peat
Berger Mix Inc. peat
ASB Greenworld Ltd. peat
Theriault and Hachey Peat Moss Ltd.
Malpec Peat Moss Ltd.
Kent Peat Moss Ltd.
Smith Cut Stone and Quarries Ltd. processed stone

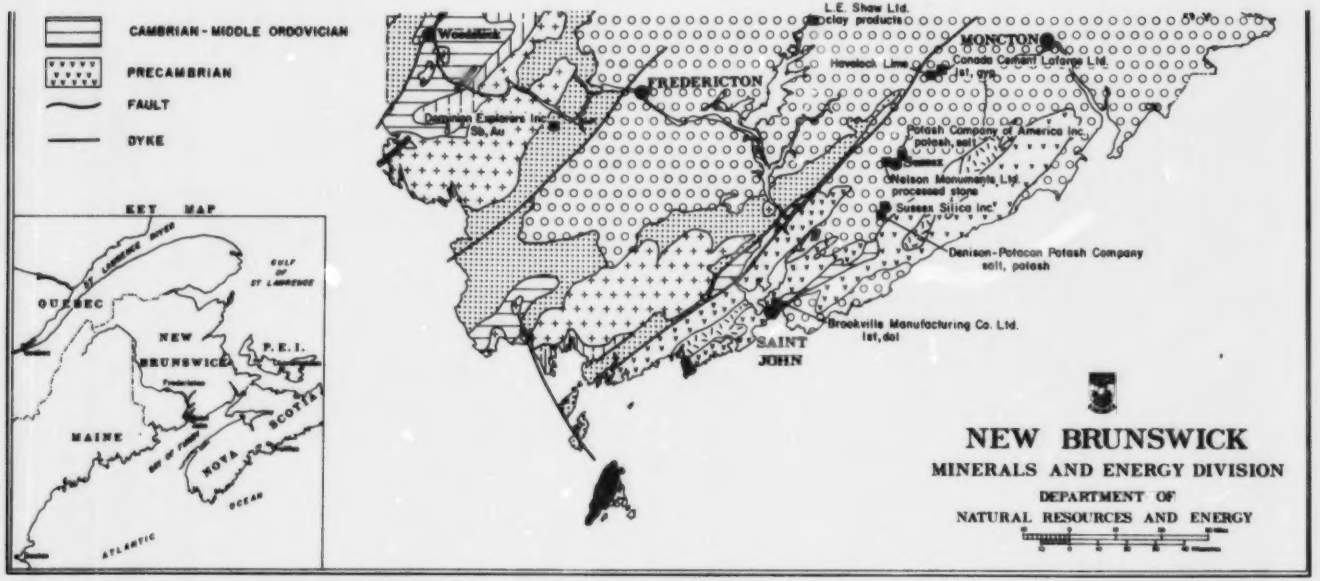


Figure 20. Nonrenewable resource producers in New Brunswick in 1987.

HISTORY: Sulphides were noted in 1907; however, drilling of ground electromagnetic targets in 1952 located the No. 6 mine. Investigation of another electromagnetic anomaly on strike pinpointed the site of the No. 12 mine in 1953. The property was granted to Brunswick Mining and Smelting Corporation Limited, which was controlled at that time by St. Joseph's Lead Company. During the period 1953-57, an open pit and pilot mill were constructed at the No. 6 location. In 1961, interest was transferred to M.J. Boylen, K.C. Irving, and Patino Corporation. Development commenced at No. 12 in 1962 and mine production began in 1964. Production began at No. 6 mine in 1966. In 1967, Noranda invested $50 000 000 and gained control of Brunswick Mining and Smelting Corporation Limited. Noranda proposed a $50 000 000 expansion, which was started in 1974 and completed in 1981. A total capital expenditure of $69 000 000 was made at the mine and smelter between 1979 and 1981.

In 1985, the adjoining Belledune Fertilizer plant, which produces a diammonium phosphate fertilizer product using sulphuric acid produced by the smelter, was purchased by Brunswick Mining and Smelting Corporation Limited. In 1986, Brunswick Mining began deepening its No. 3 shaft to 244 m.

COMPANY Head Office - P.O. Box 45, Commerce Court W., Toronto; Mine Office - P.O. Box 3000, Bathurst; Smelter Officer - P.O. Box 2000, Belledune. The President is J.C. White; Senior Vice-President is J.W. Moerman; Manager of the Mining Division is J.R. Schnarr; General Manager of the Smelter and Fertilizer Division is M.D. Street.

EMPLOYEES The number of employees was 1448, a reduction of 50 from the previous year.

RESERVES 97 182 000 t of ore grading 0.32% Cu, 3.65% Pb, 8.99% Zn and 99.0 g/t Ag (December, 1987).

PRODUCTION

	Production (t)	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
MILLED ORE (No. 12 mine)	3 446 923	0.37	3.50	8.85	104
CONCENTRATE					
Copper	33 381	20.70	8.47	3.79	2 605
Lead	193 029	.62	33.43	4.5	494
Zinc	440 265	.30	1.86	50.6	92
Bulk	77 216	.68	18.03	32.7	356
TAILINGS	2 703 032	.10	1.22	1.86	40

DEVELOPMENTS Brunswick Mining and Smelting Corporation Limited realized a profit of $19 000 000 in 1987, as compared to a loss of $6 900 000 in 1986. Of this amount $11 800 000 was operating profit and $7 900 000 resulted from the sale of investments. A distinct improvement in metal prices and a slight increase in productivity accounted for the return to profitability.

The excavation work for shaft deepening and the associated development was near completion; equipping the shaft, installation of new hoist ropes, and installation of crushers and conveyors is expected to be completed in 1988. This will eliminate bottlenecks and allow planned production rates to be realized from the two lower levels. Development of the open stoping mining method on the 1,000 level continued on schedule with target tonnages being achieved at the year's end.

21 G/14E

Dominion Explorers Inc.

LOCATION The Lake George antimony mine is situated about 15 km north of Harvey Station, York County (Figure 20).

HISTORY Antimony sulphide was first discovered on the property in 1863. There was minor production between 1880 and 1884. The first major development that led to production occurred between 1969 and 1971. The mine produced until 1981 when it ran out of known reserves. Exploration diamond drilling in 1980-1981 outlined a new antimony ore zone (No. 2 mine) with reserves of 900 000 t of 4% Sb. Development and mining began in 1985.

COMPANY The mine is owned by Dominion Explorers Inc. and operated as Durham Mines Division. The head office is located at 111 Richmond Street West, Toronto, Ontario, M5H 2G4. Chairman, president and C.E.O. is R.N. Granger; the Mine Manager is B. Bourgoin.

EMPLOYEES There were 91 persons employed on the site in 1986.

RESERVES 421 563 t of ore with 3.38% Sb (December, 1987).

PRODUCTION Production in 1987 was 90 801 t of ore yielding 4401 t of antimony concentrate.

DEVELOPENTS At the June 25th, 1987 Annual Meeting of Landmark Corporation (formerly Durham Resources Inc.) the company's Lake George antimony mine (Durham Mines) was sold to a Landmark-controlled subsidiary, Dominion Explorers Inc. The former Durham Resources Inc. now operates under Dominion Explorers Inc. (Durham Mines Division).

The mine shaft was deepened from the 350 m (1150 ft.) level to 389 m (1275 ft.) level during the year, with drifting on the 389 m (1275 ft.) level showing promising results.

Surface exploration is presently underway to extend the known antimony reserves and an exploratory crosscut was driven to the gold-bearing formation, lying parallel to the main orebody. A limited amount of drifting was done in the formation to determine its potential for development. Results are still being analysed.

Antimony prices, as with other metals, have improved significantly in 1987 resulting in a sound financial position for the operation. Production was consistent over the year in spite of the shaft work and hoist problems in the latter part of the year.

NONMETALLIC MINERALS

PEAT[13]

Seventeen companies were engaged in the production of peat moss in 1987. Fafard Peat Moss Co. Ltd. purchased Kent Peat Moss Ltd. Favourable climate in the Province contributed to record shipment levels in 1987.

The total surface area of peatlands under lease in 1987 was 9803 ha, of which about 3800 ha were developed for production. Raw peat moss accounts for 90% of the shipments with the remaining 10% consisting of peat-based soil amendments. The industry's major export markets are the United States and Japan.

Peat Shipments

Year	Bale Equivalents*
1983	3 900 000
1984	3 858 059
1985	4 100 927
1986	6 059 991
1987	6 290 049

*Bale equivalent = 0.170 m^3 of peat compressed at a ratio of 2:1, and having a 50% moisture content.

Acadian Peat Moss (1979) Ltd.

COMPANY Acadian Peat Moss (1979) Ltd., P.O. Box 240, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-2225. The President is Elphege Chiasson; the Manager is Jean-Marc Savoie.

RIGHTS Peat Moss Lease No. 13 (232 ha) on Bog 568 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 568 is adjacent to the Coteau Road on Lamèque Island, Gloucester County (Figure 20).

HISTORY Established in 1965, the company originally produced block-cut peat, but now also produces milled peat. Following a disastrous fire in 1981 the company resumed full production in 1982.

PRESENT OWNERSHIP Acadian Peat Moss (1979) Ltd.

RESERVES AND GRADE 7.33 Mm^3 surficial peat and 3.41 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	206	134	340
> 1 m	198	66	264
In Production			150

PRODUCTION The company produces baled peat.

EMPLOYEES 1987 - 8 to 71 persons.

DEVELOPMENT Continued expansion of existing lease. Production from Bog 567, held under lease by Chiasson Peat Moss Ltd., is usually included in production figures since the only bagging facilities are located at Bog 568.

ASB Greenworld Ltd.

COMPANY ASB Greenworld Ltd., Pointe-Sapin, Kent County, New Brunswick E0A 2A0. Telephone: (506) 876-3937. The Manager is Andreas Avenriep.

RIGHTS Peat Moss Lease No. 19 (627 ha) on Bog 324E, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 324E is located 1 km northwest of Pointe Sapin in Kent County (Figure 20).

HISTORY The company commenced site preparation in 1978 prior to acquiring a lease in 1982.

PRESENT OWNERSHIP ASB Greenworld Ltd.

RESERVES AND GRADE 57.29 Mm^3 surficial peat and 12.26 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	1591	386	1977
> 1 m	1360	183	1543
In Production			320

PRODUCTION The company produces baled peat and peat-soil mixes.

DEVELOPMENT The company continued to work toward increasing the ratio of soil mixes to baled peat.

EMPLOYEES 1987 - 2 to 51 persons.

Atkins and Durbrow (N.B.) Ltd.

COMPANY Atkins and Durbrow (N.B.) Ltd., P.O. Box 88, Bas-Caraquet, Gloucester County, New Brunswick E0B 1E0. Telephone: (506) 727-3385. The Manager is Eino Kivipato.

RIGHTS Peat Moss Lease No. 7 (202 ha) on Bog 600, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 600 is located on Pokesudie Island (Figure 20).

HISTORY The company has been producing peat since 1886, but first commenced production in New Brunswick in 1965. Following a disastrous fire in 1978, the operation was rebuilt and production was resumed in late 1980.

PRESENT OWNERSHIP Atkins and Durbrow (N.B.) Ltd.

RESERVES AND GRADE 2.2 Mm^3 surficial peat and 1.38 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	179	215	394
> 1 m	128	22	150
In Production			109

PRODUCTION The company produces baled peat.

DEVELOPMENT Continued peat production.

EMPLOYEES 1987 - 1 to 23 persons

Chiasson Peat Moss Ltd.

COMPANY Chiasson Peat Moss Ltd., P.O. Box 112, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-2426. The President is Elphege Chiasson; the Manager is Gilles Haché.

RIGHTS Peat Moss Lease No. 23 (76 ha) on Bog 567 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 567 is located 3 km southeast of Petit-Shippagan (Figure 20).

HISTORY The company acquired an Exploration Licence in 1982 and converted to a lease in the same year.

PRESENT OWNERSHIP Chiasson Peat Moss Ltd.

RESERVES AND GRADE 2.21 Mm^3 surficial peat and 1.06 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	65	38	103
> 1 m	53	21	74
In Production			68

PRODUCTION The company produces baled peat at an annual production capacity directly related to that of Acadian Peat Moss (1979) Ltd. The product is baled at the Acadian Peat Moss (1979) Ltd. facility owned by the same principals.

DEVELOPMENT Baled peat production was continued. A bagging plant was installed in 1987.

Fafard Peat Moss Co. Ltd.

COMPANY Fafard Peat Moss Co. Ltd., P.O. Box 70, Shippagan, Gloucester County, New Brunswick. Telephone: (506) 336-2325. The Manager is René Martin.

RIGHTS Peat Moss Lease Nos. 4 (364 ha), 5 (506 ha) and 6 (607 ha) under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bogs are in Gloucester County (Figure 20).

Lease	Bog No.	Size (ha)	Location
4	530	364	Pokemouche Bog, off Route 113 at Inkerman
5	532	506	Six Road Bog, 15 km south of Shippagan
6	529	607	Inkerman Ferry Bog, 8 km southwest of Shippagan

HISTORY The company began production at Bog 530 in 1941 producing block-cut, hand-cut peat. Block-cut peat was also produced from Bog 532 until the company began producing milled peat in 1966. The company commenced mechanized block-cut peat production in 1971 and ceased all block-cut operations in 1977.

PRESENT OWNERSHIP Fafard Peat Moss Co. Ltd.

RESERVES AND GRADE

Bog No.	Surficial (Mm^3)	Humified (Mm^3)
529	7.80	14.59
530	8.15	3.22
532	11.49	6.77

Bog areas include the following:

	Crown (ha)	Freehold (ha)	Total (ha)
Bog 529			
Total Bog	663	311	974
> 1 m	468	140	608
In Production			227
Bog 530			
Total Bog	416	67	483
> 1 m	387	41	428
In Production			159
Bog 532			
Total Bog	370	206	576
> 1 m	360	134	494
In Production			380

PRODUCTION The company produces baled peat and peat mixes.

DEVELOPMENT Continued to develop the remaining potential on Bogs 529 and 532. Sections of Bog 530 that were originally hand cut have been abandoned.

EMPLOYEES 1987 - 7 to 132 persons.

Fisons Western Corporation

COMPANY Fisons Western Corp., Maisonnette, New Brunswick E0B 1X0. Telephone: (506) 727-3428. The Manager is Edward Puhacz.

RIGHTS Peat Moss Lease No. 10 (1406 ha), No. 12 (396 ha) and No. 26 (318 ha) under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION (Figure 20)

Lease	Bog No.	Location
10	591	2 km south of Lamèque
	592	4 km southeast of Lamèque
12	562	6 km west of Lamèque at Maisonnette
26	527	1 km south of centre of Shippagan

HISTORY In 1929, Western Peat Company Limited (the forerunner of Western Peat Moss Ltd.) commenced operations on a small sphagnum bog in Whalley, British Columbia. In 1963, the original shareholders sold their interests in Western to an American company, Red Wing Peat Corporation. Western became the Canadian producing company, and Red Wing assumed the responsibility for marketing the company's products in the United States. In 1964, following up work that had begun earlier, a base of operations was established at Maisonnette (Bog 562). In 1970, Red Wing established a second base of operations in New Brunswick when it purchased Atlantic Peat Moss Co. Ltd. at Shippagan. Atlantic had produced from Bog 527 (1953-1971) and from Bog 591 since 1952. In 1974, S.B. McLaughlin Associates Limited of Toronto, Ontario purchased the holdings of the major shareholder, Red Wing, and assumed control. This was followed by the combination of the business operations of Western and Atlantic into Western Peat Moss Limited. In 1980, Fisons, a British company, acquired a 50% interest in Western Peat Moss Limited. The joint venture company was renamed Fisons Western Peat Moss Limited and then changed to Fisons Western Corporation in January 1982, when Fisons acquired the remaining McLaughlin interests. Bog 527 was abandoned in 1971 due to fire hazard to the town of Shippagan and converted to Peat Lease 26 in 1984. The new plant on Lamèque Island (Bog 591) opened in 1981.

PRESENT OWNERSHIP Fisons Western Corporation

RESERVES AND GRADE

Bog No.	Surficial (Mm^3)	Humified (Mm^3)
527	7.56	3.32
591	30.70	14.81
592	9.40	4.59
562	9.65	3.53

Bog areas include the following:

	Crown (ha)	Freehold (ha)	Total (ha)
Bog 527			
Total Bog	315	290	605
> 1 m	240	137	377
Bog 591			
Total Bog	978	256	1234
> 1 m	909	151	1060
In Production			566
Bog 592			
Total Bog	365	224	589
> 1 m	318	82	400
In Production	-	-	-
Bog 562			
Total Bog	373	168	541
> 1 m	331	48	379
In Production			373

PRODUCTION The company produces baled peat.

DEVELOPMENT Development continued on Bog 591, eventually leading to development of Bog 592.

EMPLOYEES 1987 - 11 to 170 persons

Grande-Anse Peat Moss Co. Ltd.

COMPANY Grande-Anse Peat Moss Co. Ltd., P.O. Box 90, Grande-Anse, Gloucester County, New Brunswick E0B 1P0. Telephone: (506) 732-2854. The President is Paul Tocci; the Manager is Patricia Whelton.

RIGHTS Peat Moss Lease No. 8 (166 ha) on Bog 561, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 561 is located 3 km southeast of Grande-Anse (Figure 20).

HISTORY The company started block-cut peat operations in 1961 by hand cutting, but converted to mechanization in 1966. The conversion to milled peat began in 1977.

PRESENT OWNERSHIP Grande-Anse Peat Moss Co. Ltd.

RESERVES AND GRADE 4.13 Mm^3 surficial peat and 2.98 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	137	188	325
> 1 m	118	125	243
In Production			190

PRODUCTION Company produces baled peat and peat mixes.

DEVELOPMENT Continued production.

EMPLOYEES 1987 - 8 to 35 persons.

Heveco Ltd.

COMPANY Heveco Ltd., P.O. Box 30, Tabusintac, Northumberland County, New Brunswick E0C 2A0. Telephone: (506) 779-9277. The Manager is Myles Wishart.

RIGHTS Peat Moss Lease No. 9 (1080 ha) and No. 24 (174 ha) under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 522 (Lease 24) is 2 km east of Brantville and Bog 524 (Lease 9) is 2 km southeast of Tabusintac (Figure 20).

HISTORY The company, incorporated in 1962, produces block-cut peat and peat mixes. Milled peat production commenced in 1981.

PRESENT OWNERSHIP Heveco Ltd.

RESERVES AND GRADE

Bog No.	Surficial (Mm^3)	Humified (Mm^3)
522	4.26	1.56
524	38.00	10.69

Bog areas include the following:

	Crown (ha)	Freehold (ha)	Total (ha)
Bog 522			
Total Bog	164	29	193
> 1 m	145	16	161
In Production	--	--	--

	Crown (ha)	Freehold (ha)	Total (ha)
Bog 524			
Total Bog	909	327	1 236
> 1 m	841	287	1 128
In Production			263

PRODUCTION The company produces block-cut peat and peat mixes. Bog 524 has numerous lakes throughout, which have caused drainage problems and thus reduced the area in production.

DEVELOPMENT Continued production from Bog 524.

EMPLOYEES 1987 - 7 to 98 persons.

Lamèque Peat Moss Ltd.

COMPANY Lamèque Peat Moss Ltd., P.O. Box 570, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-2293. The Manager is Florent Chiasson.

RIGHTS Peat Moss Lease No. 14 (142 ha) on Bog 580 and Peat Moss Lease No. 28 (104 ha) on Bog 578, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 580 is 4 km north of Lamèque and Bog 578 is 2 km north of Petite-Lamèque, both in Gloucester County (Figure 20).

HISTORY The company, established in 1971, is producing milled peat.

PRESENT OWNERSHIP Lamèque Peat Moss Ltd.

RESERVES AND GRADE 7.09 Mm^3 of surficial peat and 2.27 Mm^3 of humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Bog 580			
Total Bog	130	91	221
> 1 m	120	50	170
In Production			119
Bog 578			
Total Bog	63	22	85
> 1 m	45	11	56
In Production	--	--	--

PRODUCTION The company produces milled peat.

DEVELOPMENT Lamèque Peat Moss Ltd. continued to develop the Crown portion of the bog to its full potential.

EMPLOYEES 1987 - 9 to 28 persons.

Pigeon Hill Peat Moss Ltd.

COMPANY Pigeon Hill Peat Moss Ltd., P.O. Box 639, Lamèque, New Brunswick E0B 1V0. Telephone: (506) 344-5653. The President is Edmond Chiasson.

RIGHTS Peat Moss Lease No. 18 (234 ha) on Bog 569 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 569 is located at Pigeon Hill on Lamèque Island, Gloucester County (Figure 20).

HISTORY Company acquired a Peat Moss Lease in 1979.

PRESENT OWNERSHIP Pigeon Hill Peat Moss Ltd.

RESERVES AND GRADE 3.62 Mm^3 surficial peat and 2.17 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	250	40	290
> 1 m	196	30	226
In Production			145

PRODUCTION The company produces milled peat.

DEVELOPMENT Pigeon Hill Peat Moss Ltd. continued to expand production fields.

EMPLOYEES 1987 - 1 to 15 persons.

Canadian Supreme Products Ltd.

COMPANY Canadian Supreme Products Ltd., P.O. Box 570, Lamèque, N.B. E0B 1V0. Telephone: (506) 344-2293. The manager is Laurie Chiasson.

RIGHTS Peat Moss Lease No. 16 (413 ha) on Bogs 516 and 517, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bogs 516 and 517 are located 1.5 km east of Portage River, Northumberland County (Figure 20).

HISTORY Portage Peat Moss Ltd. started commercial production in 1972. In 1985, Canadian Supreme Products Ltd., an affiliate company of Lamèque Peat Moss Ltd., acquired the operation.

PRESENT OWNERSHIP Canadian Supreme Products Ltd.

RESERVES AND GRADE 6.17 Mm^3 surficial peat and 1.03 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	243	9	252
> 1 m	150	1	151
In Production			125

PRODUCTION The company produces milled peat.

DEVELOPMENT The bog continued to be developed at a rate consistent with market demand.

EMPLOYEES 1987 - 2 to 29 persons.

St-Raphaël Peat Moss Ltd.

COMPANY St-Raphaël Peat Moss Ltd., P.O. Box 570, Haut-Lamèque, New Brunswick EOB 1VO. Telephone: (506) 344-7058. The Secretary-Treasurer is Florent Chiasson.

RIGHTS Peat Moss Lease No. 17 (115 ha) on Bog 576, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 576 is 4 km east of Haut-Lamèque, Lamèque Island (Figure 20).

HISTORY Peat Moss Lease No. 17 was acquired in 1977.

PRESENT OWNERSHIP St-Raphaël Peat Moss Ltd. is an affiliate company of Lamèque Peat Moss Ltd.

RESERVES AND GRADE 3.65 Mm^3 surficial peat and 1.93 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	113	104	217
> 1 m	105	35	140
In Production			130

PRODUCTION Company produces milled peat.

DEVELOPMENT Continued peat production with bog operating at capacity. Testing the feasibility of producing a peat/fish waste compost.

EMPLOYEES 1987 - 2 to 29 persons.

Theriault and Hachey Peat Moss Ltd.

COMPANY Theriault and Hachey Peat Moss Ltd., R.R.#1, Baie-Sainte-Anne, Northumberland County, New Brunswick EOC 1AO. Telephone: (506) 228-4530. The President is Isaac Theriault; the Vice-President is Gary Williston.

RIGHTS Peat Moss Lease No. 11 (330 ha) on Bog 324W and Peat Moss Lease No. 27 (125 ha) on Bog 302A under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 324W is located 6 km south of Eel River Bridge and Bog 302A is located 7 km south of Eel River Bridge, both in Northumberland County (Figure 20).

HISTORY The company was formed in 1963, but block-cut peat had been produced from the site since 1961. In 1977 the block-cutting operation was converted to a milled peat operation. The company acquired the Peat Moss Lease on Bog 302A in 1985.

PRESENT OWNERSHIP Theriault and Hachey Peat Moss Ltd.

RESERVES AND GRADE 75.43 Mm^3 of surficial peat and 18.13 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Bog 324W			
Total Bog	2 858	181	3039
> 1 m	2 340	51	2391
In Production			92
Bog 302A			
Total Bog	233	Nil	233
> 1 m	145	Nil	145
In Production	--	--	--

PRODUCTION The company produces milled peat.

DEVELOPMENT Theriault and Hachey Peat Moss Ltd. is attempting to open up new production fields.

EMPLOYEES 1987 - 3 to 47 persons.

Kent Peat Moss Ltd.

COMPANY Kent Peat Moss Ltd., R.R. #2, Saint-Paul, Kent County, New Brunswick E0A 2B0. Telephone: (506) 955-3098. The Manager is Eloi Maillet.

RIGHTS Peat Moss Lease No. 25 (393 ha) on Bog 41, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 41 is located 0.6 km west of Birch Ridge, Kent County (Figure 20).

HISTORY The company acquired a Peat Exploration Licence in 1982 and converted to a Peat Moss Lease in 1983. In 1987, Fafard Peat Moss Co. Ltd. acquired the operation.

PRESENT OWNERSHIP Fafard Peat Moss Co. Ltd., P.O. Box 70, Shippagan, New Brunswick, E0B 2P0. Telephone: (506) 336-2325.

RESERVES AND GRADE 4.76 Mm^3 surficial peat and 2.18 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	264	80	344
> 1 m	163	53	216
In Production			40

PRODUCTION The company produces milled peat.

DEVELOPMENT Part of the bog was drained in 1983 and production commenced in 1984. The company continued to expand the bog in 1986. In 1987, the company was purchased by Fafard Peat Moss Co. Ltd.

EMPLOYEES 1987 - 2 to 12 persons.

Malpec Peat Moss Ltd.

COMPANY Malpec Peat Moss Ltd., P.O. Box 118, Rexton, New Brunswick EOA 1L0. Telephone: (506) 523-9161. The President is Solomon Curry.

RIGHTS Peat Moss Lease No. 20 (249 ha) on Bog 213 under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 213 is located 3 km west of Rexton, Kent County (Figure 20).

HISTORY The company was issued a Peat Moss Lease in 1982. It commenced milled peat production in 1985.

PRESENT OWNERSHIP Malpec Peat Moss Ltd.

RESERVES AND GRADE 38.03 Mm^3 surficial peat and 5.0 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	1 777	488	2 265
> 1 m	1 274	73	1 347
In Production			85

PRODUCTION The company produces milled peat.

DEVELOPMENT The company continued to expand production fields.

EMPLOYEES 1987 - 4 to 46 persons.

Good Earth Canada Ltd.

COMPANY Good Earth Canada Ltd., 5960 Broadway, Lancaster, N.Y., 14086, U.S.A. Telephone: (716) 684-8111. The President is Guenter Burkhardt.

RIGHTS Peat Moss Lease No. 30 (734 ha) on Bog 338, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 338 is located at Point Escuminac, 50 km east of Chatham, Kent County. (Figure 20)

HISTORY The company was issued a Peat Lease in 1986 following the cancellation of Peat Lease No. 21 (Gulf Peat Co. Ltd.) on January 31, 1986. Production began in 1987.

RESERVES AND GRADE 22.80 Mm^3 surficial peat and 7.09 Mm^3 humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	559	291	850
>1 m	501	164	665
In Production	-	-	42

PRODUCTION The company produces milled peat.

DEVELOPMENT Site preparation included land clearing and excavation of drainage ditches. A peat processing plant was built and production began late in 1987.

EMPLOYEES 1987 - 1 to 10 persons.

Berger Mix Inc.

COMPANY Berger Mix Inc., 121, R.R. #1, St-Modeste, Cté Rivière-du-Loup, Québec G0L 3W0. The President is Claudin Berger. Telephone: (418) 862-4462.

RIGHTS Peat Exploration Licence 85-1 (681 ha) on Bog 337, under the Quarriable Substances Act, Chapter Q-1, R.S.N.B. 1968.

LOCATION Bog 337 is adjacent to Hwy 117, 2 km north of St-Camille, Kent County (Figure 20).

HISTORY In 1985, Berger Mix Inc. acquired a Peat Exploration Licence that was converted to a Peat Lease in 1986. Production began in 1987.

RESERVES AND GRADE 13.46 Mm^3 of surficial peat and 1.41 Mm^3 of humified peat on a total bog area as follows:

	Crown (ha)	Freehold (ha)	Total (ha)
Total Bog	680	1	681
>1 m	413	0	413
In Production	-	-	50

PRODUCTION The company produces milled peat.

DEVELOPMENT Site preparation included land clearing and building an access road. A peat processing plant was built and production began late in 1987.

EMPLOYEES 1987 - 1 to 12 persons.

POTASH/SALT[12]

Potash Company of America, Inc. 21 H/11W,14W

COMPANY Potash Company of America, Inc., P.O. Box 1489, Sussex, New Brunswick E0E 1P0. Telephone: (506) 433-5445. The Executive Officer and Chairman is R.G. Connochie; the Mine Manager is Donald Roberts.

RIGHTS 19 187 ha Mining Lease, under Section 25(2) of the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION The Potash Company of America mine/mill facility is located about 5 km east of Sussex, Kings County, on the north side of Highway 2 (Figure 20).

HISTORY Following the discovery of potash in the Plumweseep-Penobsquis area by the New Brunswick Department of Natural Resources in 1971, exploration and development rights covering a 360 km^2 reservation area were granted to the Potash Company of America in 1973. After a comprehensive exploration programme and feasibility study, the company decided to proceed with the construction of a 5 m diameter exploratory mine shaft in the spring of 1978. The exploration shaft was completed in April and underground exploration in October of 1980. On October 27, 1980 the Potash Company of America announced that it was proceeding to production with a mine capacity of 900 000 t/a although initial capacity will be 630 000 t/a.

Mine development, mill construction and the Courtenay Bay potash shipping terminal in Saint John were completed in 1983. The first potash was produced from the mill on July 17, 1983. The first shipment of potash through the port facility in Saint John took place early in 1984.

PRESENT OWNERSHIP Rio Algom Limited, 120 Adelaide St. W, Toronto, Ontario M5H 1W5.

RESERVES AND GRADE Sufficient tonnage has been indicated by drilling to support a 1 000 000 t/a plant for 20 years or more.

PRODUCTION Potash and salt production, which commenced in 1983, continued throughout 1986 although potash production is proceeding at a reduced capacity due to problems with excess brine production and backfilling of tailings underground. Salt production levels were maintained in excess of 400 000 t/a. Sales are handled by Iroquois Salt Products Ltd. under an agreement with PCA.

DEVELOPMENT After purchasing PCA early in 1986, Rio Algom Limited has committed over $30 000 000 to improvements designed to bring the Sussex mine up to its rated capacity of 635 000 product tonnes per year by April 1987. A considerable amount has been spent in the mine to improve the reliability and capacity of the conveyor systems. In the mill, PCA has been working toward improving equipment uptime and boosting potash recovery rates. Recovery rates have improved significantly since start-up.

Work continued in improving the tailings handling system. A rock mechanics programme has also been initiated in the mine.

EMPLOYEES Average of 320 persons for 1987.

Denison-Potacan Potash Company 21 H/12E

COMPANY Denison-Potacan Potash Company, P.O. Box 5005, Sussex, New Brunswick E0E 1P0. Telephone: (506) 839-2146. The General Manager is I.N. Duke.

RIGHTS 8.887 ha Mining Lease, under Section 25(2) of the Mining Act, Chapter M-14.1, S.N.B 1985.

LOCATION Denison-Potacan Potash Company is located about 20 km southwest of Sussex, Kings County (Figure 20).

HISTORY The Salt Springs potash-salt deposit was discovered by the Department of Natural Resources in 1973. Subsequent exploration and development rights to a 120 km^2 reservation area were granted to International Minerals and Chemical Corporation (IMC). Full-scale exploration (22 drill holes) began in 1975, and was successful in confirming a significant orebody.

Despite extremely encouraging results of the drilling programme, IMC decided to sell the property to Denison Mines Limited of Toronto late in 1978. Construction of a 5 m diameter exploration mine shaft was commenced in September 1979 and reached a target depth of 835 m by 1982.

In December 1980, Denison Mines Limited assigned a 40% interest to the Potash Company of Canada Limited (Potacan). Potacan is owned jointly by Entreprise Minière et Chimique, and Kali und Salz Ag. Denison Mines Limited remains the overall development manager, with potash sales to be handled by Potacan.

A feasibility study completed in 1982 resulted in a production decision announcement on February 7, 1983.

Work on the No. 2 shaft, the production shaft, commenced in 1983, along with continued underground development and the construction of the surface infrastructure related to the mill facility, tailings storage, and brine disposal. By July, 1985 all preproduction work was completed and the first shipment of potash destined for Colombia was made on September 17, 1985.

PRESENT OWNERSHIP 60% Denison Mines Ltd., 40% Potash Company of Canada (Potacan).

RESERVES AND GRADE Underground exploration in 1982 has blocked out more than 41 000 000 t of 28.5% K_2O, sufficient for the initial 5 years of production. Together with the 22 surface drill holes, the underground work to date has established total reserves of 230 000 000 t (proven and possible).

PRODUCTION Production commenced in July 1985 and is gradually building up to the operation's annual rated capacity of 1 300 000 product tonnes.

DEVELOPMENT Emphasis was placed in bringing the mill up to its full design capacity of 780 000 t K_2O. Backfill placement in the mine began in 1987. The mill regularly achieved production levels of 85% of capacity. On-going improvements at the mill continue to increase recoveries to the design level. When a new crystallizer circuit becomes operational in 1988, recovery levels should be further improved.

EMPLOYEES 450-500 persons in 1987.

LIMESTONE/DOLOMITE[12]

Brookville Manufacturing Company Ltd. 21 H/5

COMPANY Brookville Manufacturing Company Ltd., P.O. Box 2332, Saint John, New Brunswick E2L 3V6. The Executive Officer and President is R. H. Oland; the Mine Manager is M. Sanford.

RIGHTS Original King's Land Grant

LOCATION Brookville, East Saint John, Saint John County. The quarry and crushing operation is located between Highway 1 (Sussex-Saint John Highway) and Highway 100 (Rothesay Highway), approximately 2 km east of their junction. Access to the quarry is via the Rothesay Highway (Figure 20).

HISTORY The company commenced operations more than 60 years ago, primarily producing agricultural limestone and aggregate. It has been operating almost continuously since.

PRESENT OWNERSHIP R.H. Oland (Moosehead Breweries Ltd.).

RESERVES AND GRADE At present market levels, adequate reserves of stone are estimated for at least 10 years. Although grade varies between areas of high-calcium limestone and dolomite throughout the quarry, the bulk of production is centred in the more dolomitic areas where grades fluctuate from 40 to 45% $MgCO_3$.

PRODUCTION The company produces agricultural dolomitic limestone, cement, asphaltic aggregate and road metal (200 000 to 225 000 t annually for the past 5 years).

DEVELOPMENT Continued operation.

EMPLOYEES 28 persons (average number).

LIMESTONE/GYPSUM[12]

Canada Cement Lafarge Ltd. 21 I/3W

COMPANY Canada Cement Lafarge Ltd. The plant address is R. R. #1, Havelock, New Brunswick E0A 1W0. Telephone: (506) 534-2301. The Manager is H. Kierstead.

RIGHTS 632.5 ha Mining Licence No. 1217 (includes existing plant and operating quarries); 205.5 ha Mining Licence No. 1168 (Springhill property); 302.7 ha Mining Licence No. 1090 (Intervale property). All Mining Licences are under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION Limestone quarries and cement plant are located adjacent to Highway 880, about 5 km east of Havelock, Westmorland County (Figure 20).

A gypsum quarry is located less than 5 km north of Petitcodiac, Westmorland County.

HISTORY Limestone quarries near the plant have been supplying raw material for manufacture since 1952. In 1987, the company announced plans to close its cement production facility because of depressed market conditions.

A new limestone quarry (the McGee quarry) was opened in 1986 just north of Highway 880, less than 1 km east of the plant. This quarry was opened in an area known to contain extensive reserves of high-calcium limestone. The property was partially investigated in 1976. A drilling program was undertaken in 1985 to further verify the quality and extent of the deposit prior to the establishment of the new quarry site.

Initial quarrying of gypsum at Intervale began in 1880. The Albert Manufacturing Co. produced 1179 t/a, between 1932 and 1935. In 1950, the property was acquired by Canada Cement Company Ltd. who has worked the quarry periodically.

PRESENT OWNERSHIP Canada Cement Lafarge Ltd.

RESERVES AND GRADE Reserves of high-grade limestone (i.e., 53% CaO) on properties held under Mining Licence by Lafarge Canada Inc. have been estimated between 75 000 000 t and 100 000 000 t.

Reserves of the McGee quarry are estimated in excess of 10 000 000 t of limestone grading 51% CaO or better.

At Intervale, reserves of 97% gypsum have been estimated at just less than 4 000 000 t.

PRODUCTION Historically, the company has produced approximately 200 000 t to 300 000 t of limestone annually, primarily for use in cement manufacturing. However, since the

closure of its plant, stone quarried for cement production has ceased. Despite the plant shut-down, Lafarge continued to quarry stone at its McGee quarry through 1987. The company has a 10-year agreement with Havelock Lime (a Division of Dickenson Mines Ltd.) to supply up to 400 000 t of raw stone on a yearly basis.

Canada Cement Lafarge Ltd. also produces aggregate for its subsidiary, Permanent Concrete Ltd.

Gypsum has been produced from Intervale as required (5 000 to 25 000 t/a). However, due to the scale-down and closure of the Havelock cement operation, no significant production has been recorded in recent years.

DEVELOPMENT Continued operation. Stone is supplied to Havelock Lime.

EMPLOYEES 3 persons.

LIMESTONE[12]

Elmtree Resources Ltd. 21 P/13W

COMPANY Elmtree Resources Ltd., P.O. Box 665, Bathurst, New Brunswick E2A 3Z6. Telephone: (506) 546-6382. The Executive Officer and President is A. Buzas; the Manager and Vice-President is G. M. Doucet.

RIGHTS 245.9 ha Mining Licence No. 1360, under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION The Elmtree quarry is located about 20 km north of Bathurst near the Village of Petit Rocher, Gloucester County (Figure 20).

HISTORY A quarry has existed on this site since 1880 and was operated on a 1814 t/a basis from 1930 to 1960 by Elmtree Co-op. Since 1960, it was operated on an intermittent basis until 1978 when it was acquired by Elmtree Resources Limited. Following extensive trenching and mapping, the quarry was expanded to include a crushing and screening plant, and a large storage facility.

PRESENT OWNERSHIP Elmtree Resources Ltd.

RESERVES AND GRADE Reserves appear to be adequate in the explored area for at least 10 years operation at current production levels. The cutoff grade is 50% CaO.

PRODUCTION Approximately 60 000 t of limestone was quarried and crushed, and was primarily sold to the smelter at Belledune as flux, although some was marketed as agricultural lime, construction stone and fertilizer filler.

DEVELOPMENT Continued operation.

EMPLOYEES 10 persons (average number).

Havelock Lime (a Division of Dickenson Mines Limited)

21 H/13W

COMPANY Havelock Lime, P.O. Box 59, Havelock, New Brunswick E0E 1W0. Telephone: (506) 534-2311. The General Manager is L. Murray.

RIGHTS

50.9 ha Mining Licence No. 1129 (includes plant).
66.2 ha Mining Licence No. 1268 (undeveloped).
110.9 ha Mining Licence No. 1176 (undeveloped).
39.8 ha Mining Licence No. 1170 (operating quarry).
38.4 ha Mining Licence No. 1207 (operating quarry and processing facility).
97.1 ha Claim Block 260 (undeveloped).

All rights are under the Mining Act, Chapter M-14.1, S.N.B. 1985.

LOCATION The company operates a quarry at Samphill, about 5 km west of Havelock. A processing facility is situated less than 1 km east of the Village (Figure 20).

HISTORY Havelock Lime, formerly Havelock Lime Works Ltd., has been quarrying in the area since 1939. The original company was incorporated in 1964, and in 1970 a subsidiary company, Havelock Processing Ltd., was formed to manage the manufacturing of quick and hydrated lime. In 1984, Dickenson Mines Ltd. purchased the Havelock group of companies.

PRESENT OWNERSHIP Dickenson Mines Limited

RESERVES AND GRADE Less than 5 000 000 t of 95% $CaCO_3$ are estimated to remain at Havelock's Samphill quarry following current extraction practices. However, this tonnage can be increased if a greater overburden-to-stone stripping ratio can be economically achieved.

PRODUCTION The company has traditionally produced about 250 000 t to 300 000 t of stone annually. Chemical process stone (for use as flux in nonferrous smelters, glass industry, pulp and paper mills and fibreglass), pulverized stone (for use in dusting mines and agricultural purposes), poultry grit, and crushed stone (for use as concrete aggregate and for general construction) are all listed products.

DEVELOPMENT Expansion plans are underway with the decision to construct a new kiln. A 300 t/a annular-shaft kiln installation is expected to be completed in 1988. The new kiln should realize significant fuel savings and provide long-term market competitiveness. A significant amount of stone is purchased from Lafarge Canada Inc. who operates a nearby quarry.

EMPLOYEES 34 persons (average number).

SILICA[12]

Chaleur Silica Limited — 21 P/12E

COMPANY Chaleur Silica Limited, P.O. Box 4, Site 4, Petit Rocher, New Brunswick E0B 2E0. Telephone: (506) 783-2387. The Executive Officer, President and Manager is Jean Claude Godin.

RIGHTS Original King's Land Grant.

LOCATION The Bass River silica quarry is located south of Highway 11, approximately 6.5 km east of Bathurst, Gloucester County (Figure 20).

HISTORY The property was originally explored by East Coast Smelting and Chemical Company in 1961, but the property remained undeveloped until 1974 when World Wide Explorations opened a small quarry. It was purchased by Godin M-E in 1976. The operation was expanded and modernized, and is now operated under the name Chaleur Silica Limited. A sandblast sand plant, with 77-91 t/d capacity of bagged sand, was installed in 1979.

In 1983, the company drilled five holes on a second property adjacent to the Nepisiguit River and intersected 10 m of silica similar to that already being quarried.

PRESENT OWNERSHIP The deposit is owned by A. Ronalds and G. Ronalds under an original King's Grant and mined under an agreement with Chaleur Silica Limited.

RESERVES AND GRADE Reserves are estimated to be in excess of 500 000 t of 95% SiO_2; however, most is inaccessible due to ownership problems.

PRODUCTION The quarry operates on a seasonal basis and has produced up to 60 000 t of silica annually. Markets are almost entirely dependent on the sale of silica flux to the smelter at Belledune; however, some blasting sand and nursery sand has been produced.

DEVELOPMENT Continued operation at a reduced level.

EMPLOYEES 10 to 25 persons.

Sussex Silica Inc. — 21 H/12E

COMPANY The Sussex silica deposit is jointly owned by Baskatong Quartz Ltd., P.O. Box 337, N.D.G., Montreal, Québec, H4A 3P6. Telephone: 514-482-6357; and Lockhart Exploration Services Ltd., P.O. Box 515, 328 King St., Fredericton, N.B., E3B 5A6. Mine Site: R.R.#3, Sussex, N.B. E0E 1P0. Telephone: 433-5890. Mine Manager is Robin Turner.

RIGHTS Mining Lease 241 (599 ha) and 24 claims (387 ha) under the Mining Act, Chapter M-14.1; S.N.B. 1985.

LOCATION This deposit of unconsolidated silica sand is about 16 km southwest of Sussex, immediately northeast of Cassidy Lake (Figure 20).

HISTORY The deposit was discovered in 1982. After identifying sufficient reserves of high-quality sand, a pilot plant was set up in 1983 for product testing and marketing. Full-scale production began in 1986.

PRESENT OWNERSHIP Baskatong Quartz Ltd. of Québec and Lockhart Exploration Services Ltd. have interests in the property.

RESERVES AND GRADE Approximately 9 000 000 t proven reserves and more than 22 000 000 t possible reserves of silica sand containing greater than 98% SiO_2 are indicated.

PRODUCTION Production from this mine began in the fall of 1986, consisting of several thousand tonnes of lump silica and sand of various sizes. The lump silica was used in the manufacture of silicon metal and silicon carbide at Becancour, Québec. Existing capacity of the operation is estimated at 80 000 t/a.

DEVELOPMENT Plans to gradually expand into specialty marketable products including sand blasting material, filtration, tree nursery, decorative sands and sands used in the manufacture of glass and fibreglass.

EMPLOYEES 7-9 persons.

CLAY PRODUCTS[12]

L.E. Shaw Limited 21 I/4W

COMPANY L.E. Shaw Limited, Head Office: P.O. Box 2130, Lantz, Nova Scotia B0N 1R0. Plant and Quarry Office: P.O. Box 188, Chipman, New Brunswick E0E 1C0. Telephone: (506) 339-6605. The Manager is George Roberts.

RIGHTS The company owns about 40 ha of land. Quarriable substances are vested in the owner of the land in or on which they lie.

LOCATION The quarry is located about 3 km east of the plant in Chipman, New Brunswick (Figure 20).

HISTORY In 1929, the company opened a plant in the heart of the Minto coal field at Chipman to use waste shales from the coal mines in making brick and tile. Since 1935, raw material for the plant has been obtained from the shale quarry.

PRESENT OWNERSHIP L.E. Shaw Limited.

RESERVES AND GRADE The material is purple-red sandstone, shale, and siltstone from the Hurley Creek Formation.

DEVELOPMENT The company continued to operate a brick plant using local red shale. The plant produces facing brick, drainage tile, partition tile, radial tile, interlocking tile, and flue liners. Quality acid-resistant brick can also be produced.

EMPLOYEES An average of 25 persons for both the quarry operation and manufacturing sector.

PROCESSED (DIMENSION) STONE[12]

Nelson Monuments Ltd. 21 H/12

COMPANY Nelson Monuments Ltd., P.O. Box 1220, Sussex, New Brunswick, E0E 1P0. Telephone: (506) 433-3413. Mr. Merrill Nelson is the President.

RIGHTS Quarriable substances are vested in the owner of the land in or on which they lie.

LOCATION The plant is located in Sussex, New Brunswick (Figure 20), but quarries have been operated in various places: Charlotte County and Hampstead (Figure 21) in New Brunswick, and Vermillion Bay in Ontario.

HISTORY The company was founded in 1909, and in 1959 it was moved from Hopewell Cape to Sussex.

DEVELOPMENT The company continued to produce monuments, markers, curbing stone, and stone for landscaping use. Much of the granite sold in 1987 was imported from Ontario and Overseas.

EMPLOYEES 25 persons (average number) in Sussex; 3 elsewhere in New Brunswick.

Figure 21. Tim Webb and Philip Dykeman examine a granite quarry near Hampstead.

Smith Cut Stone and Quarries Limited 21 I/2

COMPANY Smith Cut Stone and Quarries Limited, P.O. Box 69, Shediac, New Brunswick E0A 3G0. Telephone: (506) 532-6902. The President is Roy E. LeBlanc.

RIGHTS Quarriable substances are vested in the owner of the land in or on which they lie.

LOCATION Shediac, New Brunswick (Figure 20).

HISTORY Founded in 1818, this is the oldest stone quarrying company in New Brunswick. The Shediac sandstone quarry has provided building stone for numerous construction projects, including Moncton's Cathedral. For the last 25 years it has mainly provided cut stone for restoration.

DEVELOPMENT The company continued to operate a local sandstone quarry and was involved in various restoration projects.

EMPLOYEES 1 to 15 persons in 1987.

CRUSHED STONE[12,14]

Major operations producing crushed stone for use as aggregate are centred around the Fredericton and Moncton areas. Both of these areas are deficient in good quality, coarse, surficial, granular aggregate materials.

In the Fredericton area, Diamond Construction Limited maintains a crushing operation at Springhill, on the south side of the Saint John River. The material crushed is a Silurian greywacke. On the north side of the river, Forbes and Sloat Limited crushes Mississippian basalt at a quarry at Douglas, just west of Fredericton.

In the Moncton area, Moncton Crushed Stone Division of Modern Construction Ltd. crushes granitic rocks of Precambrian age at a quarry at Stilesville, northwest of the city. Manufactured fine concrete aggregate is also produced by the operation, by blending crusher-produced fine aggregate with washed natural sand trucked in from the Rogersville area. H.E. Carson Limited also operates a quarry in metasedimentary rocks in the Stilesville area. To the east of Moncton, at Gaytons, Precambrian granitic rocks are crushed by Acadia Crushed Stone Division of Modern Construction Ltd., and by MacDonald's Paving and Construction Limited. C.M. Stewart Company Limited operates a quarry in basaltic rocks in the Campbellton area.

Brookville Manufacturing Company Limited near Saint John and Havelock Lime of Havelock produce crushed dolomite and limestone, respectively, for use as aggregate, in addition to their other lime products. Elmtree Resources Limited of Bathurst also produced a limited amount of crushed limestone for use as aggregate.

Preliminary estimates of stone production for 1987 (Statistics Canada figures) are 2 465 000 t with a value of $13 750 000 (Table 3). In comparison, 1986 production was 2 030 000 t valued at $11 074 000.

SAND AND GRAVEL[12,14]

Most sand and gravel pits in New Brunswick are operated on an intermittent, on-demand basis; many of these can produce only low-specification aggregate. The comparatively few permanent operations are found where large deposits of good quality material lie within economical trucking distance of high-demand, urban areas (e.g., the Saint John area).

Preliminary estimates of sand and gravel production in New Brunswick during 1987 (Statistics Canada figures) are 9 650 000 t. Statistics Canada did not report a total dollar value for the year (Table 3). However, based on previous years, it is estimated to be between $14 000 000 and $16 000 000. In comparison, production in 1986 was 8 200 000 t valued at $16 702 000.

ENERGY RESOURCES

OIL AND GAS[22]

Irving Oil Limited 21 H/15

COMPANY Irving Oil Limited, P.O. Box 1421, Saint John, New Brunswick E2L 4K1. The President is A.L. Irving.

RIGHTS ONG lse/on-sh 74-1 (2153.7 ha) under the Oil and Natural Gas Act, Chapter O-2.1. R.S.N.B. 1976.

LOCATION The Stoney Creek field (Lease 74-1) is located 16 km south of Moncton (Figure 17)

HISTORY Lease 74-1 was granted a renewal for a 10-year period on March 15, 1984.

PRODUCTION Presently, Irving operates the oil wells while Moncton Utility Gas Company operates all gas wells. Production for 1985 to 1987 follows:

	Production	
Year	Gas (m^3)	Oil (m^3)
1985	2 125 827	629.8
1986	1 822 866	638.9
1987	1 744 683	494.8

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APPENDIX 1.

Metric Abbreviations and Conversion Factors

ABBREVIATIONS

cm - centimetre
m - metre
km - kilometre
g - gram
t - tonne
L - litre
ha - hectare
mgal - milligal
Hz - Hertz
M - mega (prefix for 1 000 000)
t/a - tonnes per year
t/d - tonnes per day

CONVERSION FACTORS

For precious metals:
ounces per ton (oz./ton) x 34.285 71 = grams per tonne (g/t)

Square miles (sq. mi.) x 2.589 988 = square kilometres (km^2)

Short tons x 0.907 184 = tonnes (t)

Acres (ac.) x 0.404 685 = hectares (ha)

For oil (1 barrel = 42 U.S. gallons):
barrels x 0.158 987 3 = cubic metres (m^3)

For natural gas:
cubic feet (cu. ft.) x 0.028 316 85 = cubic metres (m^3)